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REPORT

OF THE

METEOROLOGICAL COUNCIL

For the Year ending 31st of March 1896;

SUBMITTED TO THE

PRESIDENT AND COUNCIL

OF THE

ROYAL SOCIETY.

Presented to Parliament by Command of Her Majesty.

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THE METEOROLOGICAL COUNCIL,

1895–96.

Lieutenant-General RICHARD STRACHEY, R.E., C.S.I., LL.D., F.R.S., Chairman.

MR. ALEXANDER BUCHAN, M.A., LL.D., F.R.S.E.

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MR. ROBERT H. SCOTT, M.A., F.R.S. (Secretary).

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REPORT

OF THE

METEOROLOGICAL COUNCIL

TO THE

ROYAL SOCIETY,

For the Year ending March 31, 1896.

Introductory.

THERE has been no change in the Council during the year. The executive officers are, as stated in the last Report:—

Mr. Scott, Secretary.
Nav.-Lieut. C. W. Baillie, R.N., F.R.A.S., Marine Superintendent.

The Report is, as usual, divided into four sections or parts:

I. OCEAN METEOROLOGY.
II. WEATHER TELEGRAPHY.
III. CLIMATOLOGY.
IV. MISCELLANEOUS.

PART I.

OCEAN METEOROLOGY.

Collection of information.

Collection of Information.—The practice followed by the Office in the collection of information has been to supply observers with a complete outfit of verified instruments, on the condition of their returning the instruments, and the log of observations made with them, to the Office at the completion of the voyage.

The instruments supplied are:—
One barometer; six thermometers, with a screen; four hydrometers.

The first record of observations is made in a rough book supplied for the purpose, which is retained by the Captain, who copies the observations into a regular form of log kept for the Office. As regards the Royal Navy, Her Majesty's ships are supplied by the Office with the meteorological instruments used in the Service, and the Council are glad to say that they receive meteorological logs of high value from this source.

In order to facilitate the communications between the Office and the observers, agencies are established at some of the principal ports, and instruments are supplied direct from them to the ships.

Collection of information.

Agents.

The following is a list of the agents at present in connexion with the Office :—

Cardiff, T. L. Ainsley, Bute Docks.
Dundee, Capt. A. Wood, Navigation School.
Glasgow, Messrs. D. McGregor and Co., Clyde Place.
Greenock, Messrs. D. McGregor and Co., Brymner Street.
Hull, Messrs. Castle and Co., Commercial Road.
Liverpool, J. Gill, Nautical College.
Southampton, Capt. D. Forbes, High Street.

Mr. Z. Scaping, who had been agent for the Office at Hull since 1854, resigned the appointment at the end of the year 1895, having carried out the duties of the agency, during the whole of this long period, most satisfactorily.

The Council much regret to announce the death of Mr. J. R. Jones, who had been agent for the Office at Aberdeen since 1869, and they cannot speak too highly of the manner in which the agency had been conducted by him.

Occasionally captains are supplied at ports where there are no agencies, and in these cases the instruments are sent direct from the Office in London. The number of merchant ships supplied with standard instruments and log books during the year was 112.

A set of instruments is kept in working order at the Office in London, and at each agency, for the purpose of instructing observers in the handling and reading of all the instruments. A notice to captains is frequently distributed to vessels lying in the various London docks, and copies of it are also supplied to each agent for circulation.

Recognition of "excellent" observers.

Various publications (see App. XVI., p. 120) are presented by the Council to observers who supply the Meteorological Office with thoroughly well kept logs, in recognition of their co-operation in a work which is calculated to be of very great advantage to navigators and to science generally.

Appendix I. (p. 35) contains a list of all the observers who during the past year have contributed logs classed as "excellent." Several of these observers have regularly co-operated with the Office for many years. The names which appear in the list for the first time are as follow :—

Observer's Name.	Ship.
Dupen, P. P. - - -	S.S. "Cabenda."
Glossop, Lieut. H. A. P., R.N. -	H.M.S. "Rambler."
Goodrham, H. - - - -	S.S. "Woolloomooloo."
Livett, H. W. - - -	S.S. "Ormuz."
Lobb, Staff-Commr. F. J., R.N. -	S.S. "Richmond."
McKilliam, R. - - - -	"Salamis."
Milward, C. A., R.N.R. - -	S.S. "Otarama."
Mullan, F. C., F.R.G.S. - - -	S.S. "Romney."
Nedden, H. zur - - -	S.S. "Madeline."
Payne, C. J. - - - - -	S.S. "Elton."
Plunket, C. E. - - -	"Hurunui."

Observer's Name.	Ship.
Renaut, W. - - -	"Timaru."
Richards, Commr. G. E., R.N. -	H.M.S. "Rambler."
Tuke, F. M. - - -	S.S. "Ormuz."
Willis, J. - - - -	S.S. "Hardanger."
Worcester, W. D. G., R.N.R. -	S.S. "Victoria."

Recognition of "excellent" observers.

The Council take this opportunity of expressing their best thanks to the observers who have assisted them during the past year.

They regret to have to announce the death of one of their old observers, Captain Alexander Murray, which occurred in the summer of 1894. Captain Murray had commenced to observe for the Office in 1869, and had kept as many as 14 logs, many of them being "excellent." Captain Murray was one of the whaling captains whose observations have been peculiarly valuable, inasmuch as the Arctic seas are not much frequented by shipping.

Character of logs received.

The total number of meteorological logs received in the year ending March 31, 1896, was 143, of which 131, or over 91 per cent., have been classed as either "excellent" or "very good."

The Council continue to receive, through the Ocean Steamship Company of Liverpool, a considerable number of ships logs, mostly from voyages to and from the China Seas, viâ Suez.

The British India Steam Navigation Company have also kindly presented the Office with 560 logs of their ships.

Appendix II. (p. 37) gives a list of the meteorological logs from ships, received at the Office during the year.

Districts from which observations are obtained.

The following list gives a summary of the voyages for each Ocean, made by the ships specified in this Appendix:—

North Atlantic - -	457	Pacific Ocean, South -	77
South „ - -	157	Mediterranean - -	150
Indian Ocean - -	187	Red Sea - -	108
Pacific Ocean, North -	62	Arctic Ocean - -	6

Publications.

The following is an account of the works either published or in course of preparation in this branch of the Office during the year:—

Red Sea Charts.

Red Sea Charts.—These charts were issued early in the year. They are mainly constructed from observations obtained by steamships whose tracks lie along the central line of the sea, and they are designed to show the meteorological conditions along that line.

The wind charts have been constructed from about 75,000 observations, and the new wind-rose, referred to in the Annual Report for 1892, has been introduced, enabling an estimate to be formed of the strength as well as of the direction of the wind likely to be experienced in any part of the sea.

The well-known periodic variations in the winds are clearly shown, and minor details of the gradual advance and retreat of the

Publications. Red Sea Charts.

southerly winds, prevalent in the southern part of the sea for some two-thirds of the year, are well marked.

Gales, which are most frequent during the winter months, generally blow from the southward, and they are encountered chiefly in the southern part of the sea.

The currents in the Red Sea are somewhat erratic. They do not usually attain great velocities over large areas, but strong streams, frequently across its central line, may be experienced locally.

As an instance of this, currents, setting towards the Avocet Rock, are shown on some of the charts.

The range of sea temperature in and about the Straits of Bab-el-Mandeb, near the Island of Perim, is remarkable, amounting to 26°, at the period of the South-west monsoon. For example, in September the highest temperature recorded is 92°, and the lowest 66°. A similar difference has been observed in July and August. In June and October the difference in the extreme temperatures is 16°, and the least difference, 7°, occurs in February.

Current Charts.

Current Charts for all Oceans.—This heavy piece of work, which has occupied a portion of the staff continuously for eight years, is now approaching completion. The individual observations of current are now plotted on 48 large sheets, and the work of obtaining generalized results, which has been undertaken by the Hydrographic Department of the Admiralty, is in progress. The charts of the Indian Ocean have been printed and published. The generalized sheets, now issued, show the average direction of the current, and the minimum and maximum velocities which have been experienced. The Agulhas current, is, naturally, well shown, and the currents in the Bay of Bengal are of special interest to the navigator. From October to January there is a decided South-westerly set down the whole western coast of the Bay, but from February to June the currents entirely change their direction and set to the North eastward. In July, August, and September, however, the set of the currents is not nearly so decided along this coast.

The changes which occur in the direction of the currents round the South point of Ceylon are worthy of notice, for at the period of the North-east monsoon, November to April, the currents set to the westward round this point, but they set to the eastward when the South-west monsoon is blowing. These are some of the features shown on the charts, and it is hoped that the navigator, who until now has been obliged to rest satisfied with a single chart for the whole year, will find these monthly charts of great assistance.

Current Charts of the Arctic Regions.—These charts are for the area lying North of 60° north latitude. The information is naturally comparatively scarce, but all that is available is being used, including the currents contained in the records of the various Arctic voyages, but these are chiefly obtained from ships drifting

while fast in ice-floes, and in many cases the direction of the set only is shown on the charts, the velocity not being obtainable. Current observations are less frequently recorded in these high latitudes than in other parts of the sea. Publications.

The Meteorology of the South Sea.—The charts for this region embracing the area from the Cape of Good Hope to New Zealand and south of latitude 30° S., have been completed, and sent to the engraver. They have been drawn for each month of the year, and the whole series consists of 12 wind charts, 12 current charts, and 12 sea temperature charts. The wind charts show the prevailing winds over areas contained by 3° of latitude and 10° of longitude, and the form of wind-rose is the same as adopted in the Red Sea charts. Isobars have also been drawn on the wind charts, so that the relation between the winds and the barometrical pressure may be perceived. In the corners of the areas the percentage of fog to the number of weather observations is also given. A small inset chart shows by means of isotherms the temperature of the air, and lines indicating the limits of fog have been drawn on this chart. Meteorology of South Indian Ocean.

The Current charts for the district have been copied from the Indian Ocean charts before referred to, but they have been extended further eastward to the 180th meridian, so as to include New Zealand.

On the sea temperature charts the temperature of the sea surface is represented by isothermal lines, and the areas over which the range of temperature amounts to 20° and upwards are coloured blue.

The charts, which are the first published for that part of the ocean ought to be found very useful by the navigator, especially in connexion with the question of the westward homeward route from Australia, which is now attracting attention.

The South Atlantic and West Coast of South America.—The preparation of the logs for this district has been completed, and the extraction of the data is progressing satisfactorily. South Atlantic.

Supply of Instruments to Distant Stations.—Since the date of the last Report, an application has been received from the Foreign Office for the supply of outfits for four stations in Uganda. These instruments were at once procured and forwarded, their entire cost having been defrayed by the Foreign Office. In addition, thermometers and a rain-gauge have been supplied to Messrs. A. Miller and Co. for use near Cape Coast Castle; a barometer has been lent to the British Association African Committee for observations at Mombassa, and two rain-gauges have been issued to Mr. Hands, the observer at St. Helena, for erection at stations in that island. Supply of instruments to distant stations.

Climatological Information for Sailing Directions.—Requests are from time to time received from the Hydrographic Department for statistics as to the climates of foreign ports, for insertion in the various sailing directions and other works issued by that Information supplied for sailing directions.

Office. All information available has been supplied, and the work has entailed a certain amount of labour in searching for the data in the pages of foreign publications.

The Barometer Manual for Seamen.

The Barometer Manual for Seamen.—The Board of Trade has recently made fresh regulations with reference to the examination for certificates in the Mercantile Marine, and has introduced into the examination the subjects of the use at sea of the Thermometer and Hydrometer. It has therefore become necessary to add to the Barometer Manual for Seamen, published in 1884, an appendix containing the most important particulars as to these instruments which a sailor might require.

Collection of specimens of sea water.

Collections of Specimens of Sea Water.—A number of scientific men, at the suggestion of Prof. Petterson of Stockholm, have been carrying on inquiries into the amount of salt present in the water of the North Sea and the Baltic respectively. The research has been taken up by Mr. H. N. Dickson, F.R.S.E., who was allowed to cruise in H.M.S. "Jackal" in the North Sea in the autumn of 1894. Mr. Dickson has obtained permission from the Council to place himself in communication with captains who may be willing to fill bottles, supplied by him, with specimens of sea water collected in various positions, and to send the bottles to him from time to time for examination.

Stock of instruments belonging to the Office.

Supply and Stock of Instruments.—In Appendix III. (p. 42) is given a list of the meteorological instruments supplied by the Office to ships in the Royal Navy during the year, with a statement for the 31st March 1896 of the stock and distribution of the instruments standing on the books to the account of the Admiralty. The recent augmentation of the number of ships in commission and in reserve has led to the necessity of providing a considerably larger stock of instruments than had been required in former years.

Appendix IV. (p. 43) gives similar information with regard to the disposal of the other instruments belonging to the Office, remaining in store, or which have been supplied to the Mercantile Marine, and to observatories, telegraph stations, &c.

PART II.

Weather Telegraphy and Forecasts.

Administrative.

There have been no serious interruptions of telegraphic communication during the year, for we have fortunately escaped any serious storms, such as those which visited us in the late autumn of 1894, and, in addition, the winter of 1895–6 has been free from snow.

Among the observers there has been only one change, at Malin Head, where Mr. James Williams has succeeded Mr. Owen O'Doherty, who was obliged to resign on account of ill-health.

At St. Ann's Head, Pembrokeshire, the postal telegraph station has been abolished, but the Admiralty have been pleased to

allow the Office to make use of their telephone for communications to and from the reporting station at that place. Administrative.

A list of the telegraphic reporting stations in the United Kingdom is given in Appendix XI. (p. 84), and of the Foreign stations at the end of the same Appendix.

The work in this department goes on without any serious alteration except what arises from the constantly increasing inquiries from the public as to weather, not only current, but past, inquiries which always call for a considerable amount of investigation and research.

The only addition to the list of reporting stations has been Karlstad on Lake Wener in the interior of Sweden.

Inspection of the Telegraphic Reporting Stations.—The telegraphic reporting stations have been inspected during the year, in England by the late Rev. W. Clement Ley and Messrs. R. and J. Curtis, in Scotland by Mr. Buchan, and in Ireland and Wales by Mr. Scott. The reports submitted to the Council by the Inspectors, which are printed in Appendix V. (p. 44), show that the efficiency of the service has not been impaired. The stations in Foreign countries are controlled by the Meteorological authorities of the respective countries. Inspection of the Stations.

Discussion and Publication of the Information received.—The practice of the Office in collecting, discussing, and disseminating the meteorological information received by telegraph is described in Appendix X. of the Report for 1891. The Daily Weather Report has appeared regularly during the year; for details see that Appendix. It is distributed free of cost as follows:—To newspapers, seven copies; to seaports, for public exhibition, 71 copies; to Government offices and public institutions, 80 copies; to correspondents of the Office, 61 copies; and to foreign meteorological establishments, 35 copies. Nearly 200 copies are issued regularly to paying subscribers. Discussion of the reports. Distribution of reports.

The Weekly Weather Report, with its Monthly Appendices, has also appeared regularly; for particulars of this publication see Part III. (p. 19) and Appendix VI. (p. 72). Weekly Weather Report.

Public display at the Meteorological Office in London of the State of the Weather on British Coasts.—This arrangement, which was made with a view to the earliest possible supply to the public of the latest information as to the weather received from the principal points on the eastern, southern, and western coasts, has been regularly carried out, and it is believed with general public approval, to judge from the number of persons constantly found examining the maps and frames. The frame supplies at 9.30 a.m. and 3 p.m. every week day the substance of the reports received by telegraph, of the state of the weather and sea at the following stations: Yarmouth, Dungeness, the Needles (Hurst Castle), Scilly, Holyhead, and Valencia, and this is displayed in a conspicuous manner on the front of the Office, 63, Victoria Street, S.W. In addition, charts are exhibited at the Office door showing the very latest information which has reached the Office. These are put up at 9.30 and changed at 3 p.m. daily. Display of information in front of the Office.

Forecasts for the Admiralty.

Supply of Forecasts to the Admiralty.—At the request of the Admiralty daily forecasts were supplied to the Commander-in-Chief, Devonport, as in previous years.

Forecasts.

Weather Forecasts.—Forecasts are prepared three times a day, namely, at 11 a.m., at 3.30 p.m., and 8.30 p.m. The Forecasts prepared at 11 a.m., on the information derived from the 8 a.m. reports, refer to the probable weather between noon on the day of issue and noon on the following day. They are publicly exhibited in several places in London,* and are supplied to the afternoon editions of the newspapers. The 3.30 p.m. Forecasts are employed for storm warnings principally, excepting in the hay harvest season, when they are issued as subsequently explained. The forecasts at 8.30 p.m. are specially prepared for publication in the morning newspapers, but all the forecasts are available for the information of anyone who applies for them at the Office.

Inquiries at the Office.

The inquiries received through the Post Office for special forecasts during the year amounted to 82, and the personal applications to 65. The rules of the Office relating to such inquiries are stated in Appendix VI., p. 75.

Results of Forecasts.

The results of a comparison of the Forecasts issued at 8.30 p.m. during the year, with the weather actually experienced, are given in Appendix VII. (p. 77). The following summary shows the successes and failures over the whole United Kingdom, estimated as explained in that Appendix.

SUMMARY of RESULTS of 8.30 p.m. FORECASTS, 1895–96.

Districts.	Per-centages.				Total per-centage of Success.
	Complete Success.	Partial† Success.	Partial† Failure.	Total Failure.	
SCOTLAND, N. - -	54	28	12	6	82
„ E. -	52	28	14	6	80
ENGLAND, N.E. - -	58	25	12	5	83
„ E. - -	58	25	14	3	83
MIDLAND COUNTIES -	57	25	14	4	82
ENGLAND, S. - -	61	25	12	2	86
SCOTLAND, W. - -	52	25	15	8	77
ENGLAND, N.W. -	50	28	14	8	78
„ S.W. -	60	22	10	8	82
IRELAND, N. - -	51	25	15	9	76
„ S - -	51	22	16	11	78
Summary - -	55	25	14	6	80

* Viz., in the City at the Mansion House, Lloyd's Rooms, Messrs. R. & J. Beck's, Cornhill, and Messrs. de la Rue & Co.'s, Bunhill Row; in the West End, in the Libraries of the House of Lords and the House of Commons; at Messrs. Elliott's, St. Martin's Lane; Messrs. Stanford's, Charing Cross; Messrs. Negretti & Zambra's, Regent Street; and Messrs. Pastorelli's, New Bond Street; and at the Office, 63, Victoria Street.

† Note, "partial" implies "more than half."

Results of Forecasts.

The following table shows for each year from 1886 to 1895 inclusive the per-centages of complete and partial success of the Forecasts issued at 8.30 p.m. for the whole year. It will be seen that the total for "complete success" was highest in 1893.

PER-CENTAGES of RESULTS of FORECASTS for the whole of the BRITISH ISLES.

Year.	Complete Success.	Partial, *i.e.*, more than Half Success.	Total Success.
1886 - -	49	31	80
1887 - -	52	32	84
1888 -	51	31	82
1889 - -	49	32	81
1890 - -	50	32	82
1891 - -	50	30	80
1892 - -	46	33	79
1893 - -	59	25	84
1894 -	56	27	83
1895 - -	55	25	80
Average - -	51·7	29·8	81·5

Hay Harvest Forecasts.

Hay Harvest Forecasts.—The Council renewed in 1895 the offer made in previous years to the Royal Agricultural Society, the Royal Dublin Society, and the Highland and Agricultural Society to send Daily Forecasts *gratis* during the haymaking season to a number of observers selected by those Societies, on two conditions, viz., that the information should be made known as widely as possible, and a record of the weather actually experienced sent weekly to the Office. The Societies accepted the proposal, and the Forecasts were issued as shown in the following table:—

LIST of those who received HAY HARVEST FORECASTS in 1895.

Districts.	To whom sent.	Address.
0. SCOTLAND, N.	Rev. Dr. Joass	Golspie.
	Major Smith	Munlochy, Inverness.
1. SCOTLAND, E.	T. Wilson	Glamis Castle, by Forfar.
	C. Pirrie	Rothiemay, Huntly.
	T. Bett	Dalnaline, Aberfeldy.
2. ENGLAND, N.E.	Sir J. Wilson	Chillingham Barns, Chatton, Northumberland.
	J. Smith, F.R.H.S.	The Ferneries, Ulceby.
3. ENGLAND, E.	W. Birkbeck	High House, Thorpe, Norwich.
	Sir J. B. Lawes, Bt., and Sir J. H. Gilbert, Ph.D.	Rothamsted, Harpenden.
4. MIDLAND COUNTIES	Royal Agricultural College.	Cirencester.
	Major Fosbery	Warwick.
	T. H. Thursfield	Barrow, Broseley, Salop.
	E. E. Harcourt-Vernon	Grove Hall, East Retford.
5. ENGLAND, S.	The South-Eastern Agricultural College.	Wye, near Ashford, Kent
	C. Whitehead	Barming House, Maidstone.
	E. P. Squarey	The Moot, Downton, Wilts.
	M. J. Sutton	Kidmore Grange, Caversham.

Hay Harvest Forecasts.

Districts.	To whom sent.	Address.
6. Scotland, W.	W. Calder	Castle Hill, Dalreoch, Dumbarton.
	Sir M. J. Stewart, Bt., M.P.	Ardwell, Stranraer.
	J. Forbes	Eallabus House, Islay.
7. England, N.W.	R. Metcalfe, M.D.	Leyburn, Yorkshire.
8. England, S.W.	The Earl of Ducie	Tortworth, Gloucestershire.
	T. Dyke	Long Ashton, Clifton, Bristol.
	R. Neville Grenville	Butleigh Court, Glastonbury.
9. Ireland, N.	E. F. Farrell	Moynalty, Co. Meath.
	J. M. Wilson, J.P.	Currygrane, Edgeworthstown.
10. Ireland, S.	D. A. Milward	Lavistown, Kilkenny.
	W. Talbot Crosbie, D.L.	Ardfert Abbey, Tralee, Co. Kerry.

The telegrams were sent daily for the period of about five weeks commencing in some districts on June 10th. In some cases, by special request, they were continued for the period of the corn harvest.

In addition to the above the Forecasts were sent daily, by wire, to five gentlemen at their own cost.

The general result of the issue of these forecasts, shown by the subjoined table, has been prepared solely from the reports of the above-mentioned gentlemen, and is entirely independent of any estimate formed within the Office itself :—

Summary of Results.—Hay Harvest Forecasts, 1895.

Districts.	Names of Stations.	Per-centages.				Total per-centage of Success.
		Complete Success.	Partial Success.	Partial Failure.	Total Failure.	
Scotland, N.	Munlochy and Golspie	53	32	15	—	85
„ E.	Aberfeldy, Glamis, and Rothiemay	56	34	9	1	90
England, N.E.	Chatton and Ulceby	54	38	7	1	92
„ E.	Rothamsted and Thorpe	76	22	2	—	98
Midland Counties	Cirencester, East Retford, Warwick, Broseley.	69	20	11	—	89
England, S.	Maidstone, Downton, Caversham, and Wye.	67	26	6	1	93
Scotland, W.	Ardwell, Islay, and Dumbarton	53	28	17	2	81
England, N.W.	Leyburn	50	44	6	—	94
„ S.W.	Tortworth, Clifton, and Glastonbury	56	27	14	3	83
Ireland, N.	Moynalty and Edgeworthstown	69	22	3	6	91
„ S.	Tralee and Kilkenny	59	30	7	4	89
	Mean for all districts	60	29	9	2	89

These figures show that the Forecasts for 1895 gave a total per-centage of useful forecasts of 89, the same as in the preceding year.

Storm Warnings for the Coasts of the United Kingdom.—In Appendix VIII., p. 78, are given the names of the stations furnished with signals for Storm Warnings, in accordance with Circular 717 of the Board of Trade, issued in February 1874. Storm Warnings.

These stations were, at the end of March 1896, 206 in number, situated :—

112 in England and Wales, 60 in Scotland, 27 in Ireland, 4 in the Isle of Man, and 3 in the Channel Islands. The number of stations has been materially increased during the year by the addition of a number of lighthouses, in accordance with a suggestion made by the Royal Commission on Electrical Communication with Lighthouses.*

A comparison has been made in the Office between the warnings issued during the year and the weather experienced on our coasts, the warnings being tested by the method referred to in Appendix VI., p. 76. The results of this comparison are shown in the following tables :—

RETURN of the RESULT of the COMPARISON between the WARNINGS ISSUED and the WEATHER EXPERIENCED in 1895.

Coasts.	Total No. of Orders to hoist and repetitions.	Warnings justified by subsequent Gales. Force 8 and upwards.	Warnings justified by subsequent strong Winds. Forces 6 and 7.	Warnings not justified by subsequent Weather.	Warnings late. Force 9 reached at two Stations before issue.	Warnings partially late. Force 9 reached at one Station before issue.	Storms for which no Warning was issued.
Scotland, N.E. -	49	30	13	5	—	1	March 3, May 15–16.
,, E. -	34	18	12	4	—	—	——
,, N.W. -	48	30	14	4	—	—	——
,, W. -	45	19	20	6	—	—	——
Ireland, S.W. -	43	26	10	3	2	2	Jan. 2–3.
,, N.W. -	53	33	15	3	—	2	——
Irish Sea - -	39	31	5	2	—	1	May 15–16.
St. George's Channel	32	17	12	3	—	—	——
Bristol Channel -	31	23	7	—	—	1	——
England, S.W. -	30	25	2	1	1	1	——
,, S. -	27	18	8	1	—	—	Nov. 24.
,, S.E. -	30	19	9	2	—	—	Jan. 23.
,, E. -	32	24	6	1	—	1	Jan. 23, Mar. 24.
,, N.E. -	30	18	5	7	—	—	Jan. 23.
Totals - -	523	331	138	42	3	9	
Per-centages -	—	63·3	26·4	8·0	0·6	1·7	

* The following is the lists of the stations added to the lists in accordance with the suggestion above mentioned :—

Anvil Point.	Bull Point.	Cape Wrath.
Orfordness.	Galley Head.	Mull of Cantyre.
Montrose (Scurdyness).	Tuskar.	Mull of Galloway.
Tarbetness.	Loop Head.	Point Lynus.
Fair Isle (north end).	Gunfleet.	Nash.
Ru Stoer.	Souter Point.	Hartland Point.
Corsewall.	Girdleness.	Mine Head (Dungarvan).
Point of Ayre (Isle of Man).	Cantick.	Tory Island.
South Stack.		

Storm Warnings.

NOTES as to GALES EXPERIENCED in 1895 but for which no WARNING was issued.

January 2nd and 3rd.—Fresh to strong gale from N.W. on the south-west and south coasts of Ireland. Our northern and north-western coasts were duly warned, but the gale spread further than was expected.

January 23rd.—A North-Westerly to Northerly gale over the north-eastern and eastern parts of England. This gale was caused by the development of a depression over the North Sea. The depression was secondary to a larger system lying over the north of Russia, and its development could not be detected from the 6 p.m. observations of the previous day.

March 3rd.—Strong Northerly gale over the Orkneys and extreme north-east of Scotland on afternoon of 3rd. A very partial gale, caused by sudden increase of pressure in extreme north The 8 a.m. observation in no way justified the issue of warnings.

March 24th.—England E. A *very* strong gale from the south westward fell within a limited zone lying over the Midland and Eastern counties. At 8 a.m, on 24th (Sunday), the centre of a small and comparatively unimportant secondary depression lay over the south of Ireland. Thence it moved east-north-eastwards at a rate of more than 60 miles an hour, and reached Denmark by 6 p.m. The appearence of the 8 a.m. map was by no means bad, and the energy developed by the system later, though not unique, cannot be accounted for.

May 15th and 16th.—Scotland N.E. and the Irish Sea. A Northerly gale on various parts of the coasts named. Caused by a depression which at 8 a.m. on 15th lay over Denmark, thence it moved southward and increased in depth. We had forecasted very strong and squally winds, but did not look for this gale.

November 24th.—England S. A North-Easterly gale, due to the unexpected extension to the district named, of a gale on our east and south-east coasts, which had been duly warned for in those regions.

Comparison of results for 1895 with previous years.

The following table contains a comparative statement of the storm warnings and their results in 1895, and in the nine preceding years. It will be seen that the total per-centage of warnings justified was very good, although not equal to that for 1894.

Years.	Total No. of Warnings issued.	Warnings justified by subsequent Gales.	Warnings justified by subsequent strong Winds.	Total Warnings justified.	Warnings not justified by subsequent Weather.
		p.c.	p.c.	p.c.	p.c.
1886	542	55·3	26·9	82·2	15·9
1887	472	55·5	26·1	81·6	16·4
1888	539	55·3	28·6	83·9	14·3
1889	373	47·7	33·5	81·2	16·9
1890	525	61·0	25·5	86·5	9·3
1891	522	62·3	24·5	86·8	7·5
1892	488	59·4	31·2	90·6	6·8
1893	480	60·8	28·6	89·4	7·1
1894	502	68·5	23·5	92·0	6·0
1895	523	63·3	26·4	89·7	8·0

Fishery Barometers.—To add to the means available to the sea-going population for obtaining warnings of stormy weather barometers have for many years been supplied by the Office on loan to fishing villages and other places on the coast, to be set up for public information. The whole number of stations provided by the Office with these instruments is 213. Of these 64 are in England, 7 in Wales, 62 in Ireland, 70 in Scotland, 4 in the Isle of Man, and 1 in Jersey. The list is given in Appendix IX., p. 80. Fishery Barometers.

PART III.

Climatology.

A.—British Isles.

Observations relating to the climate of the British Isles are received by the Office from 253 stations in all. These stations may be divided into seven classes, according to the kind and completeness of the observations supplied to the Office from them, as follows:— General.

1. *Observatories.*—Seven Observatories, furnishing a continuous record of pressure, temperature, wind, sunshine, and rainfall, with frequent eye observations of cloud and weather. These alone afford the materials necessary for the study of the periodic variations of the meteorological elements. At Fort William there is no anemometer, as the country is very hilly. Self-recording observatories.

2. *Anemographic Stations.*—Nine Anemographic stations furnishing a continuous record of the wind. The records from these stations relate rather to weather as distinguished from climate, and are especially important in connexion with storms. They are often useful in affording evidence available in courts of law with respect to collisions at sea, and damage done by wind. Anemographic Stations.

3. *Barograph Stations.*—15 stations furnishing a continuous record of pressure obtained from some form of self-recording aneroid. These are valuable as giving the exact time of the occurrence of pressure maxima and minima at certain stations, and thus helping to determine the rate of movement of the various depressions that cross these islands. Barograph Stations.

4. *Sunshine Stations.*—Forty-eight stations furnishing a continuous record of bright sunshine. At 47 of these stations, the instrument in use is the Campbell-Stokes recorder (see Report for 1879, p. 32); at the other station the Jordan photographic recorder is employed. A return of the daily duration of sunshine is also received from ten other stations. Sunshine Stations.

5. *Telegraphic Stations.*—Thirty Telegraphic Reporting Stations, at which the observations are taken by eye, but supplemented in some cases by self-recording aneroids, &c. These supply the material upon which the daily weather reports and forecasts are based. Telegraphic Reporting Stations.

Telegraphic Reporting Stations.

The hours of observation at these stations are determined by the requirements of the telegraphic system, as explained in Part II., but the data which they furnish are also utilized to afford climatological information for parts of the country where Stations of the Second Order do not exist.

Stations of Second Order.

6. *Second Order Stations.*—Seventy-three Stations of the Second Order, furnishing complete climatological information from eye observations taken twice a day. The observers at these stations are all volunteers.

Stations of the Third Order.

7. *Third Order Stations.*—Stations of the Third Order furnishing returns similar in kind to those in Class 6, but with less completeness and detail.

It must be explained that some of the stations are really of a higher class than would appear from the list in App. XI., p. 84, which is compiled solely with reference to the amount of the data supplied to this Office.

For instance, at Liverpool (Bidston) and Oxford, there are regularly equipped meteorological observatories, though the stations appear only as telegraphic or Second Order Stations in the list; and the same remark applies to other cases.

A fuller account of the methods employed by the Office in dealing with these records will be found in Appendix X. (p. 81).

List of Stations.

Appendix XI. (p. 84) contains a list of the stations furnishing information relating to the land meteorology of the British Isles during the year.

Inspection of Stations.

Inspection of the Stations.—The self-recording observatories and the anemographic stations (Classes 1 and 2), as well as the Telegraphic Reporting Stations (Class 5), are regularly visited each year by the Inspectors of the Office. The extra stations (Class 7) are inspected as opportunity offers. Of the Stations of the Second Order (Class 6), some belong to the Royal Meteorological Society, and these are visited by an Inspector appointed by that Society, an allowance being made by the Office toward the cost of the inspection, in accordance with the recommendation of the Treasury Committee (1877). The remaining Stations of the Second Order, including those belonging to the Scottish Meteorological Society, are visited, most of them annually, by the Inspectors of the Office. The inspection of the self-recording observatories was carried out by Mr. Charles Chree, D.Sc., Superintendent of the Kew Observatory, and Messrs. T. W. Baker and E. G. Constable, his assistants.

Extracts from the reports of the Inspectors are given in Appendix V. p. 44.

Reports supplied to Registrar General for Ireland.

Information supplied to the General Register Office, Dublin.—Reports from the Irish stations of the Office have been regularly supplied to the Registrar General for Ireland, for his Weekly and Quarterly Returns.

Information supplied to the Welsh Land Commission.

Information on the Climate of Wales.—At the request of the Treasury such information as to the climate of Wales as was

obtainable was supplied to the Royal Commission on Land in Wales.

Publications. Weekly Weather Report.

The Weekly Weather Report, which is prepared in the Telegraphic Branch of the Office (see Appendix VI., p. 72), supplies, by its synchronous charts and Monthly Summaries, a very complete and instructive view of the chief meteorological changes, day by day, over the greater part of Europe, such as is believed not to be found in the similar publications issued by the offices in any other country.

Appendix I. to the Weekly Weather Report for 1895 gives a summary for each quarter, and for the whole year, of the Rainfall and Temperature for each district, for the 30 years 1866–1895, and also the Monthly and Progressive values of Accumulated Heat, Rainfall, and Bright Sunshine for all the districts in each month of 1895. Appendix II. to the same Report gives the Weekly and Progressive values for the same elements during the year 1895 (in continuation of Appendix II. for the year 1894).

Appendix III. gives for each week and district, during each of the three lustra and the whole period comprehended in the 15 years 1881–95, the mean or aggregate values (as necessary) for the following elements:—(1) Number of days with Rain; (2) Rainfall in inches; (3) Accumulated Heat—above and below 42° Fahrenheit; and (4) Bright Sunshine in hours and per-centages of possible duration.

Appendix IV. gives for each week and district, during the three lustra and the whole period of the 15 years 1881–95, the Mean Temperature of the Air, derived from the observations made at the stations included in the Weekly Weather Report.

Hourly Means of Meteorological Observations.

Hourly Means of Meteorological Observations.—The Volumes of Hourly Means for 1891 and 1892 have appeared and that for 1893 is in the press. These volumes give hourly means, or totals, of pressure, temperature, wind force, rain and sunshine for periods of five days, and for the months and year for the five self-recording observatories.

Publication of observations.

Observations at Stations of the Second Order.—The volume for 1891 is now issued, and that for 1892 is far advanced.

As regards the detailed publication on Form A., the list of stations for 1892 is the same as that for 1891. With regard to the B. Stations (monthly means and summaries) the list has been decreased by two, viz.,

Princetown, Dartmoor Newton Reigny, Penrith,

and increased by one,—

Tealby, Market Rasen,

making a net decrease of one station.

It should be mentioned that the volume for 1891 included in an Appendix the results for the following 12 stations for the 15 years, 1876–1890:—

Orkney.	Cheadle.	Carmarthen.
Durham.	Hillington.	Markree Castle.
Llandudno.	Uppingham.	Dublin (City).
Buxton.	Churchstoke.	Parsonstown, Birr Castle.

The information is presented in the form of Monthly Means and Summaries (15 Januarys giving the mean value for January and so on) on the International Form B.

B.—Foreign and Colonial Stations.

Foreign and Colonial Stations.

For a long time returns from various Foreign and Colonial Stations have been received at the Meteorological Office, and in previous Reports a list of such documents has been given in the Appendix which contains the list of Logs received.

During the year ending March 31st 1896, returns were received from 46 of these stations, as shown in Appendix XII., p. 90.

Most of these stations furnish observations taken twice daily, and the results are dealt with in the same way as those from Stations of the Second Order, as in Class 6 above. Continuous records of bright sunshine are received from Georgetown, British Guiana, and from Trinidad.

The results thus obtained are published from time to time when deemed of sufficient value. A second paper has been prepared in the Office on the climate of Mojanga on the N.W. coast of Madagascar and published in the Quarterly Journal of the Royal Meteorological Society.

Besides this the meteorological tables published in the official Blue Book for the island of Cyprus have been prepared in this Office.

At the present time the observations from Cape Juby on the N.W. coast of Africa, and Georgetown, Demerara, are being discussed.

PART IV.

Miscellaneous.

Anemometer Experiments.

Anemometer Experiments.—In the last Report of the Office some results were given of the indications of the pressure-tube anemometers erected on the roof of the Office in Victoria Street, and, in order to test more completely the merits of this new mode of wind measurement, the Council resolved to erect two of the instruments at two exposed points on the coast, where their indications might be compared with those of existing anemometers of the pattern known as Robinson's.

The stations selected were Holyhead and Scilly, and, accordingly in the course of the autumn a pressure-tube anemometer was erected at each (Note A., p. 24).

It has further been resolved to erect at Holyhead a pressure plate of special design, for comparison with the indications of the three other anemometers at the station, the Robinson, the bridled, and the pressure tube. It is hoped that interesting results may be secured.

Earth Temperatures.

Measurement of Earth Temperature.—For the measurement of earth temperatures—especially at considerable depths—mercury

thermometers labour under some disadvantages. A long vertical glass or metal tube holding liquid, or a shaft up which a thermometer is pulled, are alike apt to affect the temperature of the surrounding soil. With a long tube thermometer a considerable volume of the contained liquid, especially when the readings are highest, is exposed to a temperature differing from that of the bulb; while a pull-up thermometer must be very sluggish to ensure its being unaffected by the operation of reading. Earth Temperature Experiments.

Direct-reading iron-resistance thermometers, of the pattern devised by Professor Callendar, F.R.S., and Mr. E. H. Griffiths, F.R.S., have some obvious advantages. They can be laid horizontally in a hole under undisturbed soil, and read at a distance at any desired instant. The "leads" to the recording apparatus can be so laid under ground as greatly to reduce the risk of heat conduction. To test their trustworthiness, durability, and convenience for general use, two of these instruments have been laid at Kew Observatory—No. 1 at a depth of 4 feet, No. 2 at a depth of 2 feet. A standardized platinum-resistance thermometer of the ordinary type was laid alongside of No. 2, and, being read independently by means of the Kew resistance bridge and galvanometer, checks its accuracy. The thermometers were laid on Jan. 10th, under the immediate supervision of Mr. Griffiths.

Hourly Mean Values of Pressure and Temperature.—The mean hourly values of these elements for the seven observatories for each month of the 15 years 1869–1883, and for four of the observatories for the further period of seven years 1884–1890, have now been calculated, and are ready for publication. Hourly Mean Values.

Rainfall Means for the British Islands.—The Tables for Parts I. and II. of this publication have now been printed. Part I. contains the figures for the decade 1881–1890, for 492 stations, thus distributed:— Rain Tables for the British Isles.

England and Wales - - -	287
Scotland - - - -	151
Ireland - - - -	54

Of these stations several appeared in the earlier publication of the Office,* which gave the figures for the 15 years preceding 1881. There are, however, several stations included in the present issue, from which the records do not go back to 1866, or which did not appear in the former publication.

Part II. gives the figures for as many complete lustra (periods of five years), counting back from 1880 inclusive, as exist, for 157 such stations, thus distributed:—

England and Wales - - -	42
Scotland - - - -	94
Ireland - - - -	21

* *Rainfall Tables of the British Isles*, 1866–80. 8vo. 1883.

Rain Tables for the British Isles.

Part III. gives the names of the authorities for the information, with references to the pages of the two volumes on which the monthly and annual values for each year are to be found together with the mean annual and monthly rainfall for the 10 years, 1881–90, for every station. References are also given to the pages in the 1883 publicationion which the returns are published of the rain for 1866–80, for the stations not included in Part I. of the new publication.

Magnetic Observations at Valencia.

Magnetic Observations at Valencia.—At the request of certain Fellows of the Royal Society, the Council have agreed to allow Mr. Cullum, the superintendent of the observatory at Valencia, to record observations on terrestrial magnetism at that distant station.

Library, &c.

Library.

The library contains standard works on Meteorology and the allied Sciences, and is, besides, particularly rich in Transactions, Proceedings, Reports, and other Publications which give a large mass of Meteorological observational data from all parts of the world, extending over many years. It consists at present of about 13,500 volumes and pamphlets, exclusive of charts and MS. records of observations. The books and other documents are accessible to scientific men, for reference at the Office.

Appendix XIII., p. 93, contains a list of the additions to the library during the year, which have been catalogued upon cards, and are entered in the reference catalogues under (1) Authors, and (2) Subjects.

Appendix XV., p. 115, gives a list of the more important papers on scientific subjects which have appeared in the various reports issued by the Office since 1866.

Appendix XVI., p. 120, gives the usual catalogue of Office publications.

Expenditure.

Financial.

Appendix XIV., p. 114, shows the total receipts and payments of the Council during the year ending 31st March 1896. The amount voted by Parliament was 15,300*l.*, as in the previous year, in addition to which extra receipts from various sources amounting to 768*l.* 15*s.* 4*d.* also became available.

The following abstract of expenditure shows the amount properly chargeable against the Parliamentary grant of the year in question, and its distribution under the various heads, together with the increase or decrease in 1895–96, as compared with the previous year :—

Net Expenditure.	1894-95.			1895-96.			Increase.			Decrease.		
General Administration:	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
Payment of Council -	987	10	0	991	5	0	3	15	0	—		
Secretary - -	800	0	0	800	0	0	—			—		
Office - - -	891	6	9	904	10	9	13	4	0	—		
Rent, fuel, and lighting -	717	2	2	703	15	6	—			13	6	8
Alterations to premises and contingencies -	291	8	10	840	18	5	49	4	7	—		
Expenses incidental to International Meteorological Congress -	30	13	2	4	18	0	—			25	15	2
Pensions - -	159	3	3	144	0	0	—			15	3	3
Special Researches -	792	9	11	836	9	0	43	19	1	—		
Land Meteorology -	3,594	16	4	3,662	15	11	67	19	7	—		
Weather Information -	3,705	11	10	3,785	9	9	79	17	11	—		
Inspections - -	436	16	5	519	4	0	82	7	7	—		
Ocean Meteorology -	2,805	2	3	2,498	11	11	—			311	10	4
Total - - £	15,212	0	11	15,186	13	3	340	7	9	365	15	5

In the year 1895–96 the sum of 1,514*l.* 12*s.* 5*d.* was paid to the Post Office on account of inland and foreign telegrams, allowances to telegraph clerks, rental of private wires, &c.

(Signed) R. STRACHEY,
Chairman.

NOTE A.

Anemometer Experiments.

In the course of the summer two self-recording pressure-tube anemometers, similar to those described in the Annual Report of the Office for 1893, were erected, as stated in the above, p. 20, one at St. Mary's, Scilly, and the other at Salt Island, Holyhead. Both of these instruments have been placed in excellent positions, where the wind is quite free from local obstruction, and, in each case, the vane is at a height of about 40 feet from the ground.

One important purpose which these anemometers will serve is that they will afford the means of making direct comparisons of their records with those of other self-recording anemometers, of different patterns, already erected near them.

At Holyhead such a comparison may be made with the "standard" pattern Robinson cup anemometer, which has been at work for many years upon the roof of the old lighthouse; and also with the more recently erected "bridled" anemometer, on Salt Island.

At Scilly there is a Robinson anemometer of smaller size than the "standard," the cups being only 5 inches in diameter, carried on 12-inch arms, whilst in the "standard" pattern the cups are 9 inches in diameter, and the arms 24 inches in length.

Several series of experiments, made by different investigators in this country and abroad, have made it clear that the factor, or the ratio of the speed of the wind to that of the cups, of the standard pattern is about 2·2, instead of 3; the latter being the value originally given by Dr. Robinson, and since used generally for instruments of all dimensions. But although it has long been known that the factor varied, both with the size of the cup, and the length of the arm employed, yet no reliable determination of it has hitherto been made for the particular type of instrument in use at Scilly.

The erection of the pressure-tube anemometer there affords an opportunity, therefore, of making good this want. Since the scale of the latter instrument was obtained with great care, and, as it is not difficult to give it a perfectly satisfactory exposure, a good deal of confidence may be felt in accepting it as a reliable standard for the purpose.

Scilly.

The method employed in making the present comparison was to take the mean velocity for 60 consecutive minutes, as recorded by the cups of the Robinson instrument, and place it by the side of the mean for the same period as shown by the record of the pressure-tube, the latter value being obtained from the trace by estimation. In practice it has been found that this estimation can be made with a very close approach to accuracy, readings made by different observers, or by the same observer on subsequent

occasions, seldom differing by more than ± one mile. The two sets of values were first sorted into five-mile groups, and then meaned and compared.

The results of this comparison may be summarised as follows:—

(1.) The factor for Robinson anemometers having 5-inch cups, carried upon 12-inch arms, is not quite uniform with winds of all velocities.

(2.) For velocities of between 10 and 25 miles per hour the factor very closely approximates to 3; with lighter winds it decreases rapidly, and with stronger winds it also decreases, but at a much less rapid rate, the rate diminishing as the velocity increases.

During the past winter there were no gales of exceptional strength, and the number of observations of greater velocity than 45 miles per hour is, at present, much too small to allow of any conclusion being drawn from them. The above deductions apply therefore only to wind velocities not exceeding the rate of 45 miles per hour, although from the course of the curve on the accompanying diagram, Fig. I., it seems very probable that they will be found to *hold good* for higher velocities also.

In deciding upon a factor for general use with an anemometer in which it varies, as in the pattern now under discussion, it is desirable to bear in mind the relative frequency of different wind-velocities, and to select a value which will best suit the range of velocity most generally experienced, applying a correction at other points of the scale, if it should be found necessary or desirable to do so. But too much weight must not be attached to the relatively large differences shown with very light winds, as such winds are often fitful in their character, and there is a tendency for the cups, after responding readily to a slight increase in the wind force, to maintain their motion after the impulse which originated it has passed away; the record which results, is, on the whole, too high, but the individual differences are somewhat irregular, although, at the same time, never large.

By far the larger number of observations of wind-force fall within the limits of 5 and 25 miles per hour, and the mean factor for this range of velocity is 2·89, or, taking only the narrower range of 10 to 20 miles per hour, it is 2·94; and this latter value appears to be the factor it would be most desirable to adopt.

But even if we continue to use the present factor (3), the actual differences from the pressure-tube are not really very large, and do not exceed 1 mile until after the rate of 25 miles per hour has been passed. It becomes a question, therefore, whether it would not be better to retain this factor (3) for the instruments already made, and to apply a correction to their records when they attain a rate exceeding 25 miles per hour.

By doing so it will be easier to deal with the large mass of data already tabulated, and to ensure uniformity in dealing with the records obtained from this form of instrument, of which three have been at work for the Office for some years, and, under all

the circumstances, this course appears to be the best to adopt, although subsequent instruments should, no doubt, be constructed upon the basis of 2·94 as the factor.

The data used for the comparison, and upon which these conclusions are based, are set out in Table I., and also graphically in the diagram Fig. 1.

SCILLY.

FIG. I.

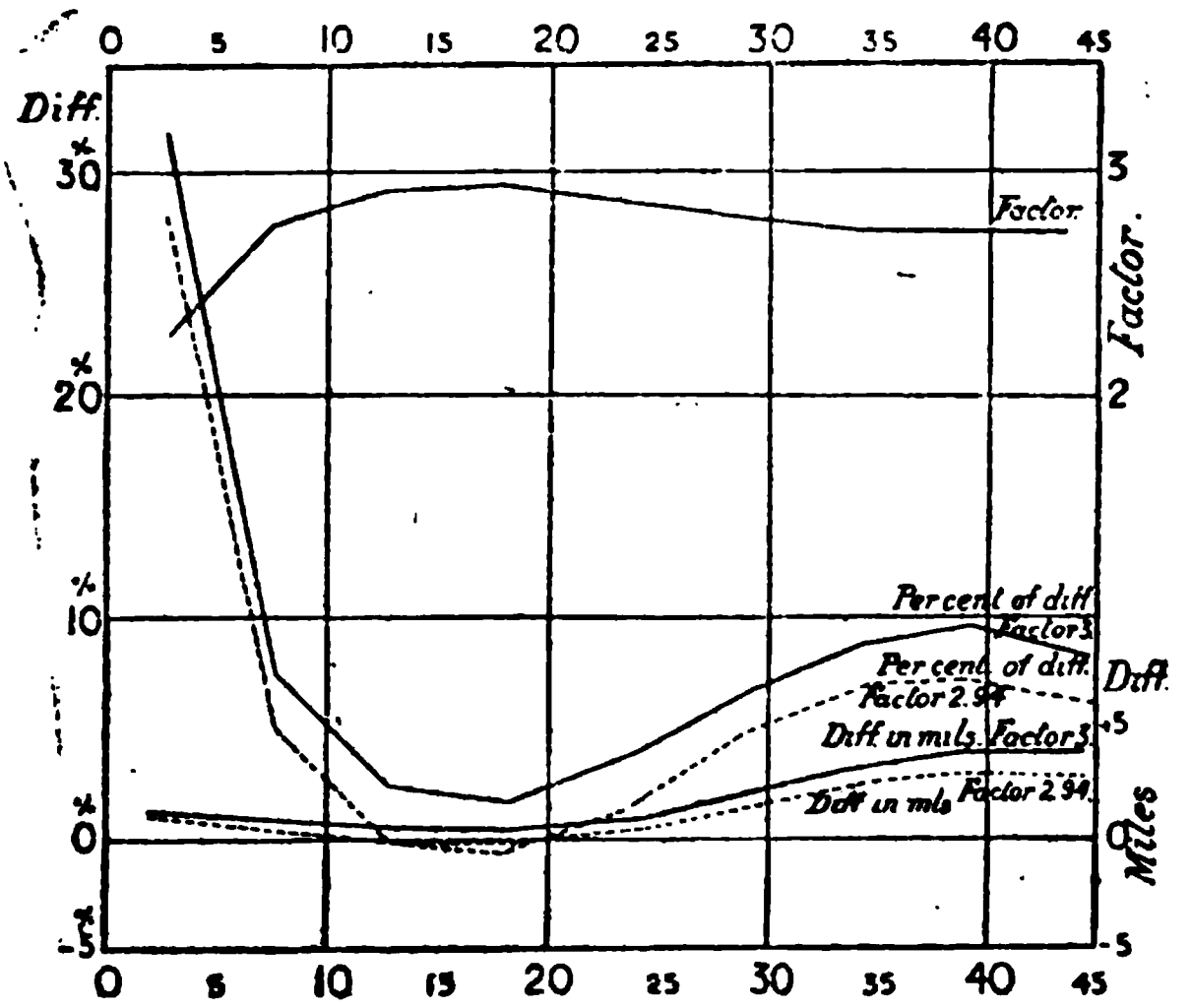

Table I.

Comparison of the Robinson Cup and Dines' Pressure-Tube Anemometers at Scilly.

Group.	Number of Observations used for Mean.	Mean Velocity by Pressure Tube.	Mean Distance traversed by Centre of Cups.	Velocity of Wind by Cups using Factor 3.	Difference between Velocity by Cups and Pressure Tube.	Per-centage of Difference to Mean Velocity by Pressure Tube.	Factor required to make Cups agree with Pressure Tube.	Velocity of Wind by Cups using Factor 2·94.	Difference between Cup Velocity Factor 2·94 and Pressure Tube.	Per-centage of Difference to Mean Velocity by Pressure Tube.
Miles.		Miles.	Miles.	Miles.	Miles (Cups—P. T.)			Miles.	Miles (Cups—P.T.)	
						Per cent.				Per cent.
0 to 5	683	3·1	1·367	4·1	+1·0	32·0	2·268	4·0	+0·9	29·0
6—10	1055	8·0	2·867	8·6	+0·6	7·5	2·790	8·4	+0·4	5·0
11—15	1120	13·1	4·467	13·4	+0·3	2·3	2·933	13·1	0·0	0·0
16—20	1102	18·4	6·233	18·7	+0·3	1·6	2·952	18·3	−0·1	0·5
21—25	720	24·0	8·300	24·9	+0·9	3·8	2·892	24·4	+0·4	1·7
26—30	456	29·0	10·300	30·9	+1·9	6·6	2·816	30·3	+1·3	4·5
31—35	213	34·0	12·333	37·0	+3·0	8·8	2·757	36·3	+2·3	6·8
36—40	167	39·0	14·233	42·7	+3·7	9·5	2·740	41·8	+2·8	7·2
41—45	76	44·0	15·900	47·7	+3·7	8·4	2·767	46·7	+2·7	6·1

Holyhead.

Bridled Anemometer.—Another comparison similar in character to that just described has been carried out between the records of the pressure-tube anemometer at Holyhead and those of the "bridled" anemometer, designed by Sir G. G. Stokes, F.R.S., the object being to test the accuracy of the scale-value of the latter instrument, and also the correctness with which the position of the zero of the scale was fixed upon the cylinder in 1894.*

These two instruments are placed side by side, advantage having been taken of the erection of the pressure-tube at the northern end of Salt Island in September 1895 to remove the bridled anemometer to the same spot, where they both occupy a perfectly unobstructed site.

Both of the anemometers are of the "*pressure*" type, as distinguished from "*velocity*," their indications being translated into equivalent velocities through the medium of the formula derived by Mr. Dines from his Hersham experiments, to which reference has already been made. The records yielded by the two instruments are very similar in character, every variation in the wind force being indicated by both; their time-scales also are nearly alike, but in their scale-values they differ considerably, the ordinate of the pressure-tube record being only one-third that of the bridled.

In other respects, however, the two instruments are very dissimilar, the bridled being actuated by the pressure of the wind upon five cups, arranged spirally upon a spindle, which is turned against the action of a weight, the amount of twist given to the spindle being the measure of the wind-force, whilst in the case of the pressure-tube this measure is got from the height to which a float is raised by the action of the wind blowing into it.

For the purpose of this comparison both records were tabulated by estimating the mean hourly values from the traces, but it is probable that owing to the greater space covered by the bridled record the chance of error in estimating from it was rather greater than was the case in dealing with the record of the pressure-tube.

The first point to notice is that the maximum forces indicated by the bridled are always higher than those shown by the pressure-tube. The cause of this is probably two-fold: in the first place it is possible that the momentum of the moving parts of the bridled, under the influence of a sudden and violent gust of wind, may carry the pen too far, and thus cause it to register a maximum in *excess* of the truth; but in the second place, it is certain that the absolute maxima recorded by the pressure-tube are always liable to be *less* than the truth, owing to the fact that the float can only rise as it becomes filled with air, and as this process may occupy a few seconds, especially if the distance from the vane to the float

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* See Appendix V. of Annual Report for 1894–5, pp. 62 *et seq.*

is great, or the connecting tube be of narrow bore, there is a possibility of the maximum strength of the gust passing away before the float has risen to the proper point. The exact proportion of the observed difference in the two records which is due to each of these causes is not yet known; but with a view to its determination the Council are about to set up, by the side of the two instruments, a maximum pressure plate, so arranged as to exclude the effect of momentum, and it is hoped that a comparison of the maxima recorded by the three instruments will enable the point to be decided.

The bridled anemometer was not intended to record low velocities, and owing partly to the large amount of friction to be overcome, and partly to the arrangement of the pulley-cords, it does not begin to record until the velocity of the wind exceeds the rate of 20 miles per hour. To guard against any error which might arise from this cause, when comparing the bridled and pressure-tube records, no observation was used unless the velocity of the wind was sufficiently above this limit as to ensure the instrument being in proper action.

Arranging the mean hourly values by each instrument in five-mile groups, as was done in the case of Scilly, and meaning each group, a very uniform difference is found to exist between the two; and assuming, as before, that the correct value is that given by the pressure-tube, it would appear that with the present scale-value and zero point, the indications of the bridled anemometer are always about 7 miles too high. It is most probable that this difference is entirely due to an error in the position of the zero point, used for setting the sheets upon the cylinder, and not to any error in the ordinate of the scale.

The reasons for coming to this conclusion are :—

(1.) If the error were in the scale-value the difference between the two records would vary with the distance measured, or in other words with the force of the wind.

(2.) The manner in which the scale-value was determined allows considerable confidence to be placed in the results obtained.

(3.) In determining experimentally the position of the zero-point with different weights, considerable disagreement was occasionally found, and if the values got by the use of the heavier weights are alone used, and those yielded by the lighter weights are discarded, the position indicated will be practically the same as by the present comparison.

Adopting this new position and applying a constant correction to the zero on the scale used for measuring the curves, which can be done without at all altering the instrument, a very close agreement between the mean velocities by the two anemometers was at once brought about.

The results of the comparison of these two instruments may therefore be summarized thus :—

(1.) The absolute maximum forces indicated by the bridled anemometer are higher than those indicated by the pressure-tube anemometer, and although no definite conclusion can be come to at present as to which of these maxima are nearest to the truth, it seems at least probable that those recorded by the bridled anemometer are more nearly correct than those of the pressure-tube.

(2.) The uniform difference between the mean velocities yielded by the two instruments indicates an error in the position of the mark hitherto used as the zero of the scale of the bridled anemometer, but does not invalidate the scale-value found for the instrument.

(3.) By applying a correction of 1·1 ins. to this point, the indications of the two instruments are found to agree throughout the scale.

Robinson Anemometer.

In the Report for the last year* an account is given of a comparison which had been carried out between the records of the bridled anemometer and those of the Robinson cup anemometer, which for many years has been at work on the top of the lighthouse at the entrance to the Old Harbour of Holyhead.

Since the removal of the bridled instrument to a better site at the northern end of Salt Island, and the erection of the pressure-tube anemometer by its side, a second comparison has been made in which the pressure-tube records, instead of the bridled, have been used to compare with the Robinson, and the results yielded by this second comparison somewhat modify those obtained last year.

This is due, in the first place, to the error since discovered in the zero of the scale of the bridled anemometer, the effect of which was to make all the indications of that instrument too high; and in the second place to the fact that in its former site, on the edge of a low cliff, and with a less satisfactory exposure than it now possesses, the bridled anemometer was itself, to some extent, affected by local influences, although to a far less degree than was the Robinson instrument.

The vane of the pressure-tube anemometer occupies a perfectly open exposure in all directions, and being carried upon a slender iron mast 44 feet above the ground, it is absolutely free from any local deflection, and is, therefore, much better adapted to serve the purpose of a standard in making the comparison.

It will not be necessary to describe again the positions and surroundings of the instruments, as they are already given in detail in the Report for last year;† but the results which are now obtained are of considerable interest as showing the character and

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* Report of the Meteorological Council 1895, note C., p. 29.

† See also a paper on "The exposure of anemometers" in the Quarterly Journal of the Royal Meteorological Society, vol. xxii., p. 287.

amount of error which may be produced by the imperfect exposure of an anemometer.

These are set out in the following Table II., in which is given, under each of eight points, and for different velocities, the mean difference between the pressure-tube and the cup instruments, after the indications of the latter had been corrected to the proper factor.

TABLE II.

Velocity limits under which Observations are Grouped.	No. of Observations.	Mean Velocity by		Difference in Miles. R.-P.T.	Per-cent. of Difference to Mean by P.T.	No. of Observations.	Mean Velocity by		Difference in Miles. R.-P.T.	Per-cent. of Difference to Mean by P.T.
		Robinson.	P. Tube.				Robinson.	P. Tube.		
		NORTH.					N.E.			
Miles.					%					%
11 to 25 -	196	17·5	15·7	+1·8	11·5	14·3	17·1	17·4	−0·3	1·7
26 „ 35 -	59	30·6	26·8	+3·8	14·2	6·1	29·6	28·9	+0·7	2·4
36 „ 45 -	6	37·7	32·5	+5·2	16·0	—	—	—	—	—
46 „ 55 -	1	47·0	41·0	+6·0	14·6	—	—	—	—	—
All Velocities	264	21·0	18·7	+2·3	12·3	20·4	20·9	20·8	+0·1	0·5
		EAST.					S.E.			
Miles.					%					%
11 to 25 -	229	17·2	19·2	−2·0	10·4	72	16·9	16·1	+0·8	5·0
26 „ 35 -	56	30·1	33·8	−3·7	11·0	10	28·9	25·3	+3·6	14·2
36 „ 45 -	15	37·7	41·7	−4·0	9·6	7	40·0	35·7	+4·7	13·3
46 „ 55 -	—	—	—	—	—	—	—	—	—	—
All Velocities	300	20·6	23·0	−2·4	10·4	89	20·0	18·6	+1·4	7·5
		SOUTH.					S.W.			
Miles.					%					%
11 to 25 -	394	18·2	16·3	+1·9	11·7	621	17·1	19·0	−1·9	10·0
26 „ 35 -	107	30·6	25·6	+4·4	17·2	99	29·3	30·1	−0·8	2·7
36 „ 45 -	17	38·8	32·8	+6·0	18·3	4	38·8	39·8	−1·0	2·5
46 „ 55 -	4	49·8	43·0	+6·8	15·8	—	—	—	—	—
All Velocities	522	21·5	19·0	+2·5	13·2	724	18·9	20·6	−1·7	8·3
		WEST.					N.W.			
Miles.					%					%
11 to 25 -	464	16·7	22·0	−5·3	24·1	302	17·1	18·6	−1·5	8·1
26 „ 35 -	90	29·7	37·5	−7·8	20·8	122	30·2	31·6	−1·4	4·4
36 „ 45 -	13	37·1	44·5	−7·4	16·6	23	38·3	39·6	−1·3	3·3
46 „ 55 -	—	—	—	—	—	—	—	—	—	—
All Velocities	567	19·3	25·0	−5·7	22·8	447	21·8	23·2	−1·4	6·0

From the figures it will be seen that, generally, the difference, irrespective of sign, increases with the velocity, and also that whilst with East, South-West, West, and North-West winds, the cups indicate *less* than the pressure-tube, with North, South-East and South winds they indicate *more*, but that with North-East winds the three instruments agree. Taking the mean of all velocities it will be found that the differences vary from a *defect* of 23 per cent., with West winds to an *excess* of 13 per cent. with South winds, a range of 36 per cent. In this table every available observation has been used, an equal distribution being made of those from intermediate points.

An unavoidable result of this distribution, however, is to modify to some extent the differences under some of the points, and therefore, another comparison was made, in which 40 observations of about the same velocity, and under each of 16 points have been used, but in which intermediate points have been excluded. The results are given in Table III., and also in Fig. II.

Table III.

Mean Difference between the Robinson and Pressure-Tube Anemometers, shown by (about) Forty Observations of Velocity between 11 and 25 miles, from each of Sixteen Points.

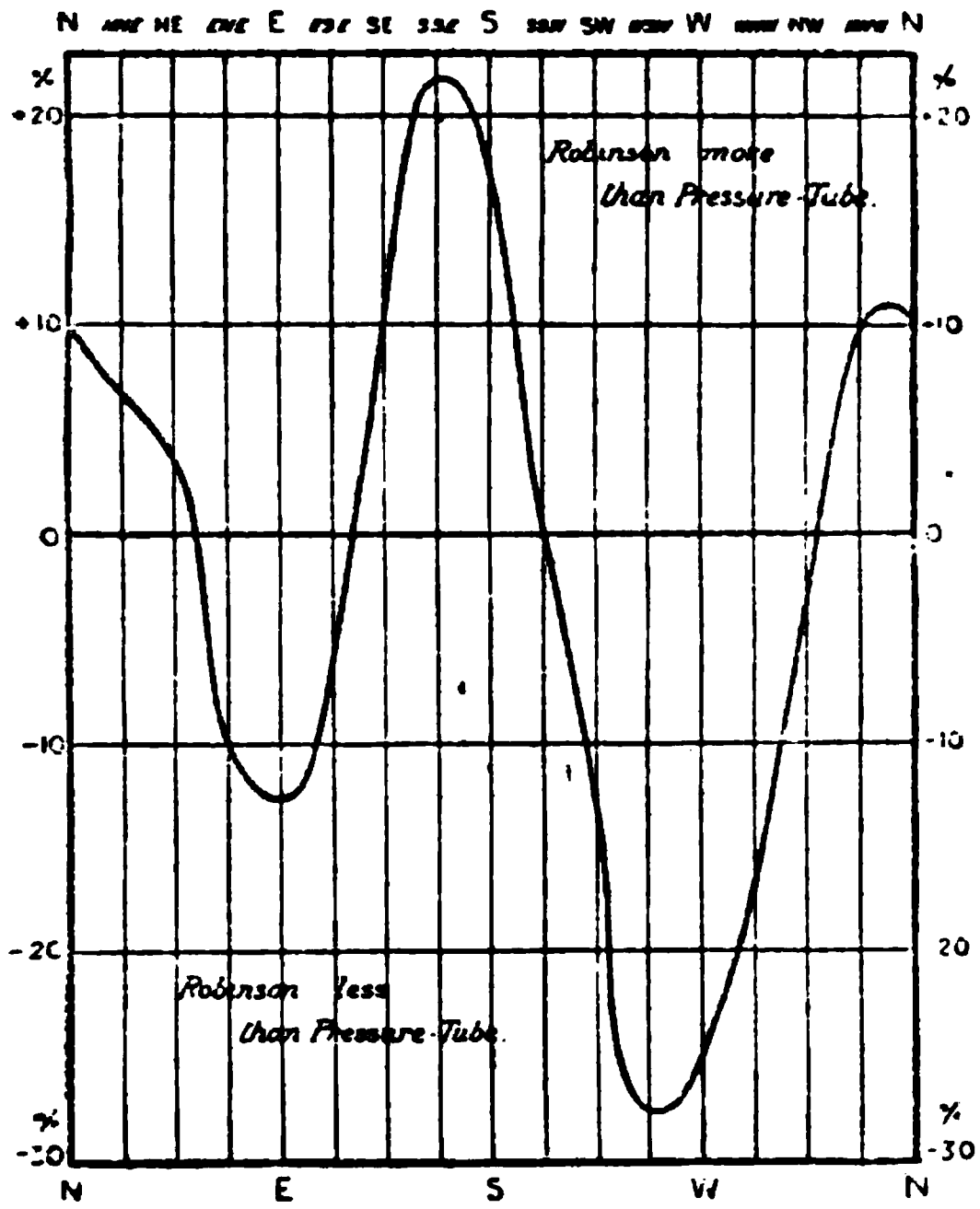
Direction of Wind.	Number of Observations.	Mean Velocity by		Difference in Miles (R.—P.T.).	Per-centage of Difference to Mean by P.-Tube.
		Robinson.	Pressure-Tube.		
					%
North	40	18·2	16·5	+1·7	+10·3
N.N.E.	37*	15·4	14·4	+1·0	+ 6·9
N.E.	23*	19·2	18·5	+0·7	+ 3·8
E.N.E.	40	18·0	20·0	−2·0	−10·0
East	40	17·7	20·3	−2·6	−12·8
E.S.E.	21*	15·5	16·6	−1·1	− 6·6
S.E.	18*	15·2	13·7	+1·5	+10·9
S.S.E.	18*	21·2	17·4	+3·8	+21·8
South	40	18·6	15·8	+2·8	+17·7
S.S.W.	40	16·5	16·4	+0·1	+ 0·6
S.W.	40	19·4	22·3	−2·9	−13·0
W.S.W.	40	17·5	24·2	−6·7	−27·7
West	40	16·6	22·2	−5·6	−25·2
W.N.W.	40	17·4	21·0	−3·6	−17·1
N.W.	40	18·4	19·0	−0·6	− 3·2
N.N.W.	40	18·0	16·4	+1·6	+ 9·8

* In these cases so many as forty observations were not available.

Here a remarkably uniform distribution of the differences, both in sign and in amount, is shown as we proceed round the compass, the curve being very symmetrical, and exhibiting two maxima on each side of zero.

Starting with an excess of 10 per cent. with North winds, which is the first plus maximum, the difference diminishes to 4 per cent. at N.E.; it then changes into a defect, which increases to a first minus maximum, of 13 per cent., under East. Proceeding, the minus difference now decreases, and after passing E.S.E., its sign once more changes to plus, reaching 22 per cent. at S.S.E., which is the second and principal maximum under that sign. At S.S.W. the two records agree; then a minus difference is again shown, which quickly increases to 28 per cent. at W.S.W., which is the largest difference under any point. At West there is a defect of 25 per cent., which then decreases rapidly, and after passing N.W. the difference again changes its sign, and increases to plus 10 per cent. at N.N.W.

FIG. II.



The excess of the Robinson record over the pressure-tube with North winds is, no doubt, due to the wind being thrown up over the roof of the sheds, when it strikes their Northern side, which it will be remembered is closed, and presents an abrupt obstacle to the progress of the air from that quarter. With Southerly winds also, a similar action takes place, because although the sheds are open in that direction they become filled with compressed air, which is unable to escape at the back, and so reacts on the wind in much the same way as does the closed Northern side; in both cases the cups receive more than their proper amount of wind owing to the mingling of the deflected current with that which is proper to the level of the cups.

With Easterly and Westerly winds, however, the action of the sheds is very different. These winds blow in the direction of the length of the sheds and, as was pointed out in connexion with the previous comparison, the wind is now sucked into a huge conduit, and drawn down from the roof, with the result that the cups get less than their proper amount of wind. This effect is most marked with Westerly winds because it so happens that one large opening in that direction is almost immediately beneath the cups of the anemometer.

Owing partly to the weight of the standard size Robinson anemometer, and partly to the conditions imposed by its mechanism, it is not always easy to find for it an unexceptionable exposure, and one great advantage which the pressure-tube instrument possesses over any other, is the facility with which it can be placed in a satisfactory position, there being none of the shafting or gearing to provide for, which so often proves an insuperable difficulty in other cases.

R. H. Curtis.

APPENDIX.

APPENDIX I.

LIST of CAPTAINS and OFFICERS who have sent in Logs classed as "Excellent" during the year ending March 31, 1896. The figures opposite to each show the total number of such Logs which they have returned to the Office during the period that they have been observing.

Name of Captain or Officer.	Number of "Excellent" Logs.	Ship.
Alford, F. - - -	3	S S. "Monarch."
Andersen, O. E. - -	14	S.S. "Longhirst."
Angus, T. S. - - -	12	S.S. "Ballaarat."
Atkinson, G. W. - -	13	S.S. "Valetta."
Bolton, S. H. - - -	19	S.S. "El Dorado."
Bright, H. - - -	10	Barque "Beltana."
Campbell, J. - - -	11	"Balmoral."
Chesshire, G. H. - -	5	S.S. "Aldgate."
Crotty, F. H. - - -	7	"Evesham Abbey."
Crowley, C. - - -	10	"Verajean."
Dart, L. C. - - -	15	Barque "Alcides."
De Horne, M. - -	6	S.S. "Carthage."
Dulling, G. - - -	3	S.S. "Strathclyde."
Dupen, P. P. - - -	1	S.S. "Cabenda."
Dyke, H. W. - - -	12	Barque "General Roberts."
Elliott, Mr. C. - -	6	S.S. "Wilcannia."
Elliott, W., R.N.R., F.R. Met. Soc.	12	S.S. "Clan Murray."
England, T. - - -	17	Barque "Glen Grant."
Exham, T. K., F.R.A.S. -	18	S.S. "Elbe" S.S. "Esk," and S.S. "Trent."
Fraser, W. D. - - -	8	"Corolla."
Free, T., R.N.R. - - -	3	S.S. "Port Chalmers."
Gibson, J. H. - - -	2	S.S. "Wydale."
Glossop, Lieut. H. A. P., R.N.	3	H.M.S. "Rambler."
Goodrham, H. - - -	2	S.S. "Woolloomooloo."
Hepworth, M. W. C., R.N.R. -	14	S.S. "Port Melbourne."
Livett, H. W. - - -	1	S.S. "Ormuz."
Lobb, Staff-Comr. F. J., R.N. -	1	L.H. Tender "Richmond."
McKilliam, R. - - -	1	"Salamis."
Millican, J. W. - -	11	S.S. "Loughrigg Holme."
Milner, W. H. - - -	22	S.S. "Pará."
Milward, C. A., R.N.R. -	1	S.S. "Otarama."
Mitchell, J. - - -	4	Barque "Cape York."

Name of Captain or Officer.	Number of "Excellent" Logs.	Ship.
Moignard, P.	8	"Garsdale."
Mullan, F. C., F.R.G.S.	1	S.S. "Romney."
Murdoch, P.	16	"Sierra Lucena."
Murray, A.	3	Barque "Perseverance."
Nedden, H. zur	3	S.S. "Madeline."
Payne, C. J.	1	S.S. "Elton."
Peebles, R.	18	S.S. "Breconshire."
Pentin, W.	6	S.S. "Wilcannia."
Plunket, C. E.	1	Barque "Hurunui."
Price, J. H.	9	"Othello."
Renaut, W.	1	"Timaru."
Richards, Comr. G. E., R.N.	3	H.M.S. "Rambler."
Sargent, A. H.	9	"Pleione."
Simpson, Alexander	21	S.S. "Thermopylæ."
—— Alexander	25	S.S. "Traveller."
Spalding, T. F.	8	S.S. "Australasian."
Thomas, H. G.	3	S.S. "Yarrawonga."
Trott, S., F.R.Met.Soc.	30	S.S. "Minia."
Tuke, F. M.	1	S.S. "Ormuz."
Tyson, J.	3	S.S. "Arab."
Walker, H., R.N.R.	20	S.S. "Etruria" and S.S. "Campania."
Willis, J.	1	S.S. "Hardanger."
Wilson, J., R.N.R.	13	S.S. "Ethiopia."
Worcester, W. D. G., R.N.R.	2	S.S. "Victoria."

APPENDIX II.

List of Documents received from Ships.

Captain's Name.	Ship.	Voyage.	Year.
[1] Alford, F.	H.M.T.S. Monarch	Off coast of British Isles	1894–95
Alsop, J. J.	Barque Brussels	Brisbane and Portland (Oregon)	1895–96
Andersen, O. E.	S.S. Longhirst	New York, Tampico (Mexico) and Montreal.	1895
[2] „ „	„	Mediterranean Ports	1895
[3] Angus, T. S.	S.S. Ballaarat	Sydney, viâ Suez	1895
„ „	„	Australia, viâ Suez	1895
[4] Atkinson, G. W.	S.S. Valetta	Sydney, viâ Suez	1894–95
[5] „ „	„	„ „	1895
[6] „ „	„	„ „	1895–96
Balfour, A. F., R.N.	H.M.S. Penguin	At New Georgia, Solomon Islands	1893–95
[7] Barker, D.W., R.N.R.	School Ship Worcester	Off Greenhithe, Kent	1895
Barr, J.	S.S. Sarpedon	Batavia, viâ Suez	1892–93
[8] Barr, John	Falls of Foyers	San Francisco and Portland (Or.)	1894–95
Barwise, —	S.S. Telemachus	China, viâ Suez	1892–93
Batt, H. E.	S.S. Pyrrhus	„ „	1892–93
Beeching, Charles	Barque Ellesmere	Calcutta	1894–95
[9] Bell, C. H.	S.S. Laconia	Mediterranean Ports	1894–95
[10] „ „	„	Alexandria and Odessa	1895–96
Bolton, S. H.	S.S. El Dorado	Continental Ports	1895
[11] Brander, J. H.	R.M.S. Thames	East Coast of South America	1895–96
Bright, H.	Barque Beltana	Adelaide	1895–96
[12] Brown, J. W.	S.S. Lucigen	Philadelphia	1895
Burton, G.	S.S. Rangatira	New Zealand, viâ Cape Good Hope, and home, viâ Cape Horn.	1895
[13] Cameron, J. G., R.N.R.	R.M.S. Teutonic	New York	1894–95
[14] „ „	„	„	1895
Campbell, James	Balmoral	New York and Calcutta	1895
[15] Cheshire, G. H.	S.S. Aldgate	New Orleans, Bremerhaven, and Buenos Ayres.	1894–95
[16] „ „	„	La Plata and New Orleans	1895
Crotty, F. C.	Evesham Abbey	Madras, Calcutta, New York, Yokohama, San Francisco, Portland (Oregon).	1893–95
Crowley, C.	Verujean	Home from Alexandria	1895
Dart, L. C.	Barque Alcides	New York, China, and New York	1894–95
„ „	„	New York and Calcutta	1895–96
[17] Davies, J. A.	S.S. Oanfa	China and Japan, viâ Suez, and Odessa.	1895
[18] „ „	„	China and Japan, viâ Suez	1895–96
[19] Davis, G. W.	S.S. Alberta	Bombay, viâ Suez	1895
[20] „ „	„	Singapore viâ Cape of Good Hope, New Caledonia, Sydney, and home, viâ Suez.	1895–96
Day, Robert	S.S. Deucalion	Batavia, viâ Suez	1892–93
[21] De Horne, M.	S.S. Carthage	Bombay, viâ Suez	1895
[22] „ „	„	„ „	1895
[23] „ „	„	„ „	1896
Dickens, E. G.	S.S. Diomed	China, viâ Suez	1892
[24] Dickinson, L. R.	R.M.S. Medway	West Indies	1894–95
[25] Dulling, George	S.S. Strathclyde	Bombay, viâ Suez	1895
[26] „ „	„	Vladivostok, viâ Suez, China, Japan, and New York, viâ Suez.	1895–96
[27] Dupen, P. P.	S.S. Cabenda	West Coast of Africa	1895–96
Dyke, H. W.	Barque General Roberts	Port Phillip, Newcastle (N.S.W.), San Diego (Cal.), and Portland (Oregon).	1894–95

	Captain's Name.	Ship.	Voyage.	Year.
27	Elliott, Wm., R.N.R.	S.S. Clan Murray	Chittagong, viâ Suez	1894–95
	,, ,,	,,	Bombay, viâ Suez	1895
	,, ,,	,,	Bombay and Madras, viâ Suez	1895
	,, ,,	,,	India, viâ Suez	1895–96
	England, Thomas	Barque Glen Grant	Apalachicola and St. Thomas (W.I.).	1894–95
	,, ,,	,,	Pascagoula and Pensacola	1895
18	Exham, T. K.	R.M.S. Elbe	From Buenos Ayres to St. Vincent	1894
	,, ,,	R.M.S. Esk	To St. Thomas, W.I.	1894
	,, ,,	R.M.S. Trent	East Coast of South America	1894–95
	,, ,,	,,	,, ,,	1895
28	Ford, J. G.	Barque Lady Head	Moose, Hudson's Bay	1895
	Fraser, W. D.	Corolla	New York, Yokohama, Port Townsend, Valparaiso, and Talcahuhano.	1893–95
29	Free, Thomas, R.N.R.	S.S. Port Chalmers	Sydney, viâ Cape Good Hope, and home, viâ Suez.	1894–95
30	,, ,,	,,	,, ,,	1895
	Gibson, J. H.	S.S. Wydale	Port Royal (South Carolina), Pensacola, Newport News, and Antwerp.	1895
31	Goodrham, Henry	S.S. Woolloomooloo	Adelaide, viâ Cape, and home, viâ Suez.	1895
32	,, ,,	,,	Australia, viâ Cape	1895
	Goodwin, J. H.	S.S. Hector	Batavia, viâ Suez	1892–93
	Gracie, G. S.	Holyrood	Melbourne	1894–95
33	Grassam, John	Blackadder	Brisbane	1895–96
34	Griffin, E. J., R.N.R.	R.M.S. Moor	Cape Town	1894–95
34	,, ,,	,,	,,	1895–96
	Hannah, W. T.	S.S. Glaucus	Batavia, viâ Suez	1891–93
	Heath, P. I.	S.S. Ajax	China, viâ Suez	1893
15	Hepworth, M. W. C., R.N.R.	S.S. Port Melbourne	Sydney, viâ Cape Town, and home, viâ Suez.	1895–96
35	Hillcoat, C. H.	S.S. Britannia	Bombay, viâ Suez	1895–96
	Hutchinson, J. W. P.	S.S. Stentor	Batavia, viâ Suez	1892–93
	Jackson, M. H. F.	S.S. Telamon	China and New York, viâ Suez	1892–93
	,, T. S.	S.S. Palinurus	China, viâ Suez	1892
	James, E. G.	Barque Pendragon	Cape Town, Newcastle (New South Wales), Valparaiso, and Pisagua	1893–95
36	,, ,,	,,	Pisagua	1895–96
37	Jones, J. H.	Andora	Callao, Taltal, New York, Sydney, and Noumea.	1893–95
	Kerr, J. J.	S.S. Cascapœdia	Yokohama, viâ Suez	1894–95
	,, ,,	,,	East Coast of South America	1895–96
	Larmer, G.	S.S. Scot	Cape Town	1895
	Lawrison, G. M.	Eaton Hall	Vancouver and Tacoma	1894–95
	Leigh, Thomas	S.S. Japan	From Hong Kong, viâ Suez	1895
38	Lindsay, Paull M.	Barque Elvira	Pernambuco and Deleware River	1895
39	Livett, H. W.	R.M.S. Ormuz	Australia, viâ Suez	1895
40	Lobb, Staff.-Comr. F. J., R.N.	I.H. Tender Richmond	At Nassau, Bahamas	1895
	Long, J. C.	S.S. Japan	Bombay and Singapore, viâ Suez	1894–95
41	McKilliam, R.	Salamis	Melbourne	1895–96
	Macpherson, Patrick	Barque Bankville	Seychelles, Rangoon, Rio Janeiro, New Zealand.	1893–95
42	Mann, Robert	Barque Crown of Germany.	San Francisco and Melbourne	1893–95

	Captain's Name.	Ship.	Voyage.	Year.
	Martin, T. C.	Loch Tay	Melbourne	1894–95
7	Miller, A. T., R.N.	School Ship Conway	Off Rock Ferry, Cheshire	1895
43	Millican, J. W.	S.S. Loughrigg Holme	East Coast of North America and Mediterranean Ports.	1894–95
43	" "	" "	Newfoundland, &c.	1895
	Milner, W. H.	R.M.S. Pará	West Indies	1895
44	" "	"	"	1895
45	" "	"	"	1895–96
46	Milward, C. A., R.N.R.	S.S. Otarama	New Zealand, viâ Cape of Good Hope, and home, viâ Cape Horn.	1895–96
	Mitchell, George	S.S. California	New Orleans, Mediterranean Ports, and New York.	1894–95
	" "	"	New York and Naples	1895–96
	Mitchell, John	Barque Cape York	Nagasaki, Vancouver, and home	1894–95
	Moignard, Phillip	Garsdale	San Francisco	1893–95
	Mullan, F. C., F.R.G.S.	S.S. Romney	To China, Japan, viâ Suez	1894–95
47	Murdoch, Peter	Sierra Lucena	Mauritius and Rangoon	1894–95
	Murray, A.	Barque Perseverance	Hudson's Bay	1894–95
48	Nedden, H. zur	S.S. Madeline	Mediterranean Ports	1895
49	" "	"	Charleston, S.C.	1895
50	" "	"	Singapore, Moulmein, and Bremen, viâ Suez.	1895
	Niles, W. H.	Ben Cruachan	Cape Town and Albany	1894
51	Payne, C. J.	S.S. Elton	Odessa, Wilmington, Rangoon, viâ Suez.	1894–95
52	" "	"	Buenos Ayres	1895
53	Peebles, R.	S.S. Breconshire	China and Japan, viâ Suez, Singapore, Brisbane, and home, viâ Suez.	1895–96
54	Pentin, Walter	S.S. Wilcannia	New York, Cape Town, Sydney, and home, viâ Suez.	1895
55	" "	"	Adelaide, viâ Cape, and home, viâ Suez.	1895
	Plunket, C. E.	Barque Hurunui	Lyttelton	1894–95
	Price, J. H.	Othello	Melbourne	1894–95
	Pulford, J.	S.S. Patroclus	Batavia, viâ Suez	1892
	Rawlings, E. S.	S.S. Ajax	China, viâ Suez	1892
56	Renaut, William	Timaru	Melbourne	1894–95
57	Richards, G. E., R.N.	H.M.S. Rambler	Madeira and off West Coast of Africa.	1894–95
57	" "	"	Off West Coast of Africa and to Bermuda and Halifax.	1894–95
57	" "	"	At Halifax and West Indies	1895
58	Rigaud, H. C.	R.M.S. Magdalena	East Coast of South America	1894–95
59	" "	"	" "	1895
	Riley, I.	S.S. Teucer	Hong Kong, viâ Suez	1892–93
15	Sargent, A. H.	Pleione	New Zealand	1894–95
60	Shanklin, J. W.	S.S. Circassia	New York	1894–95
61	" "	" "	"	1895
61	" "	" "	"	1895
	Simpson, Alexander	S.S. Thermopylæ	Australia, viâ Cape Town	1894–95
	" "	"	Melbourne, viâ Cape Town	1895
62	" "	"	" "	1895–96
	Simpson, Alexander	Barquentine Traveller	Ivigtut	1895
63	Simpson, Lieut. and Comr. C. H., R.N.	H.M.S. Stork	At Malta	1894–95
63	" "	"	In Mediterranean	1895
63	" "	"	"	1895
	Smith, Alexander	Sophocles	Sydney	1894–95
64	Smyth, W. H.	S.S. Pretoria	Cape Town	1895

Captain's Name.	Ship.	Voyage.	Year.
Spalding, T. F.	S.S. Australasian	Melbourne, viâ Cape Town	1894–95
[65] Tait, Henry	S.S. Australia	Bombay, viâ Suez	1895
[66] " "	"	" "	1895–96
Tate, W. J. M.	Langstone	Wellington	1894–95
[67] Thomas, H. G.	S.S. Yarrawonga	Adelaide, viâ Cape of Good Hope, and home, viâ Suez.	1895–96
[68] Thompson, W. B.	British Merchant	Melbourne, Newcastle (N.S.W.), Panama, and Portland (Oregon).	1894–95
Towell, William	S.S. Jason	Batavia, viâ Suez	1892–93
[69] Trott, Samuel	S.S. Minia	Off East Coast of N. America	1895
[69] " "	"	In Boston Harbour, and at Halifax	1895
[70] Tuke, F. M.	R.M.S. Ormuz	Sydney, viâ Suez	1895
[70] " "	"	"	1895–96
[71] Tyson, John	S.S. Arab	Cape Town, &c.	1895
[71] " "	"	Zanzibar, viâ Cape Town, &c.	1895
[71] " "	S.S. Guelph	Cape Town, &c.	1895
[72] " "	"	" "	1895–96
[73] Vaughan, James	Barque Sokoto	San Francisco	1895
[74] Walker, Henry	S.S. Etruria	New York	1894–95
[74] " "	S.S. Campania	"	1895
Williams, D.	Barque Fleetwood	Mauritius	1894
[75] Williams, John	Barque Elisa	Demerara, Savannah, Monte Video, and Antwerp.	1894–95
[77] Williamson, J. C.	S.S. Argyll	China, Japan, viâ Suez, and New York.	1894–95
[78] Willis, James	S.S. Hardanger	Constantinople	1895
[79] Wilson, John, R.N.R.	S.S. Ethiopia	New York	1895
[80] " "	"	"	1895–96
Woods, R. R	S.S. Japan	Singapore to China and Japan	1895
[81] Worcester, W. D. G., R.N.R.	S.S. Victoria	Sydney, viâ Suez	1895
[82] " "	"	Bombay, viâ Suez, and home, viâ Cape Town.	1895
[83] " "	"	Bombay, viâ Suez, Cape Town, and home, viâ Suez.	1895–96

In cases distinguished by marginal numbers the Meteorological Registers were kept chiefly by Officers, as follows:—

[1] Kept by C. Hart, Chief Officer, A. Broadbridge, 2nd Officer, and F. Bourdeaux, 3rd Officer.
[2] [illegible] 1st Mate.
[3] [illegible] Officer, and S. S.
[4] [illegible]
[5] [illegible], Cossey, and H.
[6] [illegible]rland.
[7]
[8]
[9] [illegible]her Officers.
[10]
[11] [illegible]derson.
[12] [illegible]sisted by A. P.
[13]
[14] [illegible]s Kidwell.
[15]
[16]
[17] [illegible]ficer.
[18] [illegible] Thom.
[19] [illegible]er, and Thomas
[20] Kept by [illegible] Younghusband, 2nd Officer.
[21] Kept by T. C. E. Deyns, 5th Officer, C. F. Winthrop, 6th Officer, assisted by F. Murrell Wright, 5th Officer, and P. McBarnet, 4th Officer.
[22] Kept by F. L. Miller, 5th Officer.
[23] Kept by A. H. Hignett, 6th Officer, and C. F. Winthrop, 5th Officer.
[24] Kept by L. G. Tebbs and other Officers.
[25] Kept by W. H. Comeck, 2nd Officer.
[26] Kept by C. C. Bosse, 2nd Officer.
[27] Assisted by Messrs. Gamble and Mackenzie, 2nd and 3rd Officers.
[28] Assisted by Messrs. Gulland and Reid.
[29] Assisted by Walter Plugge, 1st Mate, Wm. Matthew, 2nd Mate, and Fred. Tonbridge, 3rd Mate.
[30] Assisted by Walter Plugge, 1st Mate, Fred. Tonbridge, 2nd Mate, and E. N. Lewer, 3rd Mate.
[31] Kept by Gabriel Threlfall, 2nd Officer.
[32] Kept by A. Rogers, 1st Officer, H. W. Read, 2nd Officer, and M. Rattey, 3rd Officer.
[33] Kept by W. M. Lloyd, 1st Mate, and F. Holdone, 2nd Mate.
[34] Kept by E. H. Neave, 4th Officer.
[35] Kept by R. H. Browne.
[36] Kept by R. Parren, 1st Officer, R. Taylor, 2nd Officer, and E. Green, 3rd Officer.
[37] Kept by Messrs. Nicholas and Innes.
[38] Kept by Wm. Johnstone.
[39] Kept by F. W. Kershaw, assisted by E. J. Tayler, 3rd Officer, and C. H. Bryant, 4th Officer.
[40] Kept by F. W. Holden, Chief Officer.
[41] Assisted by W. J. Burge, 1st Officer, and A. E. J. Snead, 2nd Officer.

42 Kept by John McIlgorm, Chief Officer.
43 Assisted by S. I. Holm, and J. Bland.
44 Kept by H. S. Smith, 5th Officer, and other Officers.
45 Kept by Officers.
46 Kept by C. M. Gibson, 4th Officer, assisted by N. E. Bower, 2nd Officer, and N. R. D. Cornwall, 3rd Officer.
47 Assisted by F. H. O'Brien.
48 Assisted by D. Jones, 2nd Mate.
49 Assisted by Wm. Ferguson, 2nd Mate.
50 Assisted by Wm. Divine, 1st Mate.
51 Kept by J. Sowerby.
52 Kept by J. Sowerby and F. Lant.
53 Assisted by J. Heron, 1st Officer, and G. Elliott, 2nd Officer.
54 Kept by Coulton Elliott, William Williams, and Walter James Hinks.
55 Kept by Coulton Elliott and William Williams.
56 Kept by Hugh W. Gray.
57 Kept by Lieut. H. A. P. Glossop, R.N.
58 Kept by B. G. M. Eldridge, 3rd Officer, R. A. Ellis, 4th Officer, Thos. McDougall, 5th Officer, and E. J. Miall, 5th Officer.
59 Kept by E. J. Miall, 5th Officer.
60 Kept by Mr. Beaton, 4th Officer.
61 Kept by Francis G. Main, 3rd Officer.
62 Assisted by W. Douglas, 1st Officer, J. Patterson, 2nd Officer, and H. Troubridge, 3rd Officer.
63 Kept by Lieut. L. D. Penfold, R.N.
64 Kept by G. Gilpin, 2nd Officer.
65 Kept by R. Caldwell, 2nd Officer, and J. Lindsay, 3rd Officer.
66 Ditto.
67 Assisted by S. Pidgeon, 2nd Officer, L. Gibbs, 3rd Officer, and G. Woore, 4th Officer.
68 Assisted by E. O. Hardwicke, Mate.
69 Kept by W. G. Squares, Chief Officer.
70 Kept by E. J. Tayler, assisted by F. W. Kershaw, 2nd Officer, and C. H. Bryant, 4th Officer.
71 Kept by G. R. P. Thwaites.
72 Kept by E. H. Neave, 3rd Officer.
73 Kept by Thomas Auld and H. Sawyer.
74 Kept by A. R. Mackay, R.N.R., and A. H. U. Smyth.
75 Kept by A. H. U. Smyth and J. Harrold.
76 Kept by F. W. Wilsden and Harold Fothergill.
77 Kept by W. E. Mitchell, 2nd Officer.
78 Assisted by Jas. Harland, 1st Mate.
79 Assisted by Wm. Cook, 3rd Officer.
80 Assisted by James S. Noble, 3rd Officer.
81 Kept by J. Stuart Wilde, 2nd Officer, W. H. Sweney, 3rd Officer, and H. J. Rhoades, 4th Officer.
82 Kept by W. H. Sweney, 3rd Officer, C. E. Trelawney, 4th Officer, and D. F. Murray, 5th Officer.
83 Kept by W. H. Sweney, 3rd Officer, D. F. Murray, R.N.R., 4th Officer, and J. Armstrong, R.N.R.

APPENDIX III.

INSTRUMENTS supplied, &c. to the Royal Navy.

Per Account.	Barometers.	Aneroids.	Thermometers.				Hydrometers.
			Ordinary.	Max.	Min.	Screens.	
April 1st, 1895, afloat - -	243	589	1,425	354	355	203	63
Issued since - -	82	186	430	96	97	51	—
	325	775	1,855	450	452	254	68
Returned since - -	93	174	441	78	76	29	14
April 1st, 1896, afloat -	232	601	1,414	372	376	225	54

INSTRUMENTS supplied, &c. for use at Naval Stations.

April 1st, 1895, in use -	77	71	237	33	41	10	11
Issued since - -	—	7	36	2	3	—	—
	77	78	273	35	44	10	11
Returned since - -	—	4	29	1	1	—	—
April 1st, 1896, in use -	77	74	244	34	43	10	11

DISPOSITION of ADMIRALTY INSTRUMENTS on April 1st, 1896.

Afloat in Royal Navy - -	232	601	1,414	372	376	225	54
In use at stations - -	77	74	244	34	43	10	11
In store at M.O. - -	69	172	172	76	92	33	50
„ Chatham - -	16	46	85	23	24	17	15
„ Sheerness - -	6	22	40	14	15	8	6
„ Portsmouth -	22	54	146	50	53	27	9
„ Devonport -	18	34	117	37	37	12	16
„ Queenstown -	2	4	14	3	3	—	4
„ Gibraltar - -	1	3	9	3	3	—	4
„ Malta - -	12	18	47	7	8	3	6
„ Bombay - -	5	1	10	4	4	1	4
„ Halifax - -	3	4	22	5	4	2	7
„ Bermuda - -	6	6	20	6	8	2	4
„ Jamaica - -	2	3	27	2	2	1	3
„ Cape of Good Hope	3	7	16	4	4	3	4
„ Trincomalee -	5	7	14	2	4	1	4
„ Hong Kong -	13	12	24	10	13	3	21
„ Coquimbo -	3	6	14	4	3	1	19
„ Sydney - -	4	6	25	9	3	1	11
„ Esquimalt - -	4	7	18	3	6	—	—
Total, April 1st, 1896 -	503	1,087	2,478	669	705	350	252
Lost, &c. since April 1st, 1895	—	5	266	35	20	18	5
Under repair April 1st, 1896 -	34	—	—	—	—	—	—

APPENDIX IV.

Instruments supplied, &c. to Mercantile Marine.

Per Account.	Barometers.	Compasses.	Thermometers.				Hydrometers.
			Ordinary.	Max.	Min.	Screens.	
April 1st, 1895, afloat - -	105	—	618	—	1	96	326
Issued since - - -	81	—	478	—	—	67	265
	186	—	1,096	—	1	163	591
Returned since - -	74	—	437	—	—	59	218
April 1st, 1896, afloat - -	112	—	659	—	1	104	373

Instruments at Stations, viz., Telegraph Offices, Observatories, Fishing Villages, &c.

April 1st, 1895, in use - -	290	2	272	58	74	58	13
Issued since - - -	19	1	50	6	4	3	7
	309	3	322	64	78	61	20
Returned since - -	11	1	26	3	2	3	4
April 1st, 1896, in use - -	298*	2	296	61	76	58	16

Disposition of Board of Trade Instruments on April 1st, 1896.

In merchant ships - -	112	—	659	—	1	104	373
In use at stations - -	298	2	296	61	76	58	16
In store at M.O. - -	33	3	132	19	26	39	116
At Liverpool Agency -	3	—	16	—	—	7	8
„ Aberdeen „ -	5	—	47	—	3	5	30
„ Glasgow „ -	6	—	33	—	—	3	23
„ Dundee „ -	6	—	33	—	—	8	21
„ Hull „ -	3	—	11	—	—	2	8
„ Cardiff „ -	3	—	23	—	—	1	17
„ Southampton „ -	2	—	13	—	—	5	19
Total, April 1st, 1896 -	471	5	1,263	80	106	232	631
Lost, &c. since April 1st, 1895	—	—	156	1	—	22	50
Under repair April 1st, 1896 -	22	—	9	—	—	—	1

* Of these barometers 208 are lent for use of seafaring communities at fishing villages and ports.

APPENDIX V.

REPORT OF INSPECTION OF THE IRISH AND WELSH STATIONS, 1895.

Donaghadee, visited September 13th.—The instruments were all in good order. The rain-gauge is rather sheltered by the proximity of trees in the churchyard.

Lissan, visited September 14th.—The station is in good order. A new rain-gauge has been procured, which was much required.

Armagh, visited September 14th.—Everything here was in good order. The sunshine recorder has been moved so that the shadow of the anemometer shaft does not fall on it.

Colebrooke, visited September 16th.—The station calls for no remark; the observer may possibly be changed.

Londonderry, visited September 17th.—The observer was absent. The rain-gauge is much overshadowed by a thorn bush, but such defects are almost unavoidable in town gardens.

Malin Head, visited September 18th.—At this station a building is being erected for the coastguard look-out. This necessitates the removal of thermometer screen and rain-gauge, and I had to give instructions for the erection of a wall to enclose them and keep off cattle.

Edenfel, visited September 19th.—This station sends observations for the Weekly Weather Report. It was in good order.

Markree, visited September 20th.—This station was, as usual, in perfect order, Mr. Marth being a most careful observer.

Belmullet, visited September 23rd.—The only matter calling for remark here is that the wind vane does not move quite freely. It was made under the directions of the postal engineer, the instrument supplied by the Office having been blown away. I have given directions for more frequent oiling.

Currygrane, visited September 25th.—This station is not very satisfactory, the observer being careless.

Arley Cottage, visited September 26th.—This station was in very good order, Major Maxwell being very attentive to the observations.

Holyhead, visited September 28th.—The new observer, Chope, has the instruments in good order, but reads rather too hurriedly.

Dublin, Fitzwilliam Square, visited September 30th.—This station was, as usual, in perfect order, but the exposure is insufficient.

Dublin, Glasnevin, visited September 30th.—The instruments were in good order and observations well taken.

Mountjoy Observatory, visited October 1st.—This station calls for no remark; it was, as usual, quite satisfactory.

Killiney, visited October 1st.—This is a station reporting rain only. The gauge is on a lawn, with some trees about, but fairly well exposed.

Parsonstown, visited October 3rd.—This station was in good order; the two observers are very much more careful than their predecessors.

Killarney, visited October 4th.—This is a weekly weather report station. The instruments were in good order.

Valencia Observatory, visited October 5th.—I found the instruments in good order.

Roche's Point, visited October 7th.—This station was in good order.

Mount Trenchard, visited October 8th.—This is a weekly weather report station. The instruments were in good order.

Roxborough, Limerick, visited October 8th.—This is a new rain station. The gauge is on the lawn, well exposed.

St. David's, visited October 10th.—This station was, as usual, in perfect order.

St. Ann's Head, visited October 11th.—The instruments are in good order.

Cardiff, visited October 12th.—I visited the agency here, which had become disorganized since the death of the late agent. I hope it may now go on satisfactorily.

The only stations unvisited have been Kilkenny and Llandovery.

The usual table of thermometer corrections is appended.

(Signed) ROBERT H. SCOTT.

THERMOMETER COMPARISONS, 1895.

Corrections to be applied to the readings :—

STATIONS.	Inspector's Standard corrected.	Dry Bulb.	Wet Bulb.	Spare Therm.	Max. Therm.	Min. Therm.	Grass Min.	REMARKS.
		°	°	°	°	°	°	
Armagh - -	57·1	−0·1	−0·1	—	−0·9	−0·1	+0·5	
Belmullet -	57·6	−0·3	−0·4	−0·1	+0·1	−0·1	—	
Brookeborough	63·3	−0·3	−0·6	—	0·0	−0·3	—	
Donaghadee -	60·0	−0·2	−0·3	+0·1	0·0	+0·1	—	
Dublin (City) -	61·2	−0·5	−0·5	—	−0·9	−0·1	—	
Dublin (Glasnevin).	59·1	−0·4	−0·8	—	0·0	+0·8	+0·2	
Dublin (Phœnix Park).	59·7	−0·3	−0·3	—	−0·4	+0·7	+0·5	
Edenfel (Omagh).	57·6	—	—	−0·4*	+0·2	0·0	—	* Standard Therm.
Edgeworthstown.	61·4	−0·3	−0·4	—	+0·9	+0·3	+1·1	
Foynes - -	59·4	—	—	—	−0·2	+0·5	—	
Holyhead -	62·6	0·0	−0·1	+0·3	−0·2	+0·4	—	
Killarney -	60·0	−0·1	−0·2	—	−0·1	0·0	—	
Lissan - -	59·1	0·0	0·0	—	−0·1	+0·5	—	
Londonderry -	59·8	−0·2	−0·2	—	0·0	+0·4	—	
Malin Head -	59·8	−0·2	−0·2	—	0·0	+0·4	—	
Markree Castle	57·5	0·0	0·0	−0·1†	−0·4	+0·4	—	† Kew Stand., No. 518.
Mount Nugent	62·4	−0·1	−0·2	—	−0·1	0·0	+0·3	
Parsonstown -	53·1	−0·4	+0·2	—	+0·2	+0·3	—	Second Order Reports.
Parsonstown -	—	—	—	—	0·0	+0·2	—	Tel. reporting insts.
Roche's Point -	53·8	−0·4	−0·2	—	−0·1	+0·5	—	
St. David's -	53·3	−0·1	−0·1	—	+0·5	+0·1	+0·4	
St. Ann's Head	52·9	−0·2	+0·1	−0·1	0·0	−0·1	—	
Valencia -	54·8	−0·2	−0·3	—	−0·1	+0·8	—	

Report of Inspection of Scottish Stations for the Year 1895.

Barometers.

The barometers at the stations were compared with inspector's standard No. 690, which was in good order and correct during the inspection, as shown by a comparison with a standard barometer in Edinburgh previous to and also subsequent to the inspections. I have to report that the barometers specified in Table I. were found to be correct, allowance being made for known instrumental errors, and were correctly observed.

Table I.

Stations.	Inspector's Standard No. 690 corrected.	Reporting Barometer uncorrected.	Check Barometer uncorrected.	Remarks.
	Inches.	Inches.	Inches.	
Fort William	29·639	29·643	—	
Fort Augustus	29·978	29·980	—	
Stornoway	30·085	30·084	30·084	
Strathpeffer	29·720	29·720	—	
Dunrobin	30·018	30·018	—	
Wick	29·802	29·800	—	Check bar. 15 min. later in shop.
Nairn	30·138	30·137	30·138	
Aberdeen	29·704	29·706	29·704	
Braemar	28·784	28·782	—	
Dundee	29·711	29·710	—	
Machrihanish	·770	·768	—	
Ardrossan	·917	·916	—	
Glasgow	·643	·644	—	
Pinmore	·788	·790	—	
Marchmont	·104	·050	—	
Edinburgh	·110	·135	—	
Leith	·481	·482	29·482	
Ochtertyre	29·509	29·500	—	

The minimum thermometers were very carefully examined, with the result that all of them were found in good order, with the single exception of the thermometer at Wick, which showed about 9° of the spirit lodged in the top of the tube. I was informed that separation took place only a few days prior to my visit, and that meanwhile 10° had been added to each reading in making up the daily telegraphic report.

Table II.

Errors of the Thermometers at the Stations.

Stations.	Standard Thermometer. No. 4433.	Dry Bulb.	Wet Bulb.	Spare Thermometer.	Max. Thermometer.	Min. Thermometer.	Time in Water in Minutes.	Change of Temperature.	Remarks.
Fort William -	60°0	+0°2	+0°2	—	0°0	−0°1	180	+0°2	B B on grass +0°1.
Do. Observatory	60·0	—	—	—	0·0	−0·7			
Fort Augustus -	57·8	0·0	0·0	—	+0·1	−0·5	80	Uniform	
Stornoway -	65·2	+0·7	+0·6	—	−0·3	+0·1	120	+0·3	
Strathpeffer -	61·2	0·0	0·0	—	−0·1	−0·1	150	−0·4	B B on grass −0·6.
Dunrobin -	63·9	+0·1	+0·1	—	+0·2	−0·1	80	−0·3	
Wick - -	60·3	+0·5	+0·5	—	0·0	0·0	65	+0·3	
Nairn - -	59·3	+0·7	+0·8	+0·2	+0·2	−0·1	70	+0·2	
Aberdeen -	63·0	+0·4	+0·4	—	+0·3	+0·4	70	Uniform	
Braemar -	56·1	+0·5	+0·5	—	0·0	−0·3	160	+0·2	
Dundee - -	60·1	−0·5	−0·5	—	+1·4	−0·2	70	Uniform	
Machrihanish -	61·4	0·0	+1·1	—	+0·2	0·0	180	+0·3	
Ardrossan -	60·0	+0·3	+0·3	—	−0·1	−0·1	80	+0·1	
Glasgow - -	61·0	—	—	—	0·0	−0·1	85	Uniform	
Pinmore -	59·2	+0·1	−0·1	—	−0·2	0·0	95	Do.	
Marchmont -	61·7	0·0	0·0	—	+0·1	+0·1	100	+0·3	
Edinburgh -	51·2	+0·2	0·0	—	−0·1	0·0	90	Uniform	
Leith - -	52·3	+0·4	+0·1	—	−0·1	−0·3	80	Do.	
Ochtertyre -	52·0	+0·1	0·0	—	0·0	0·0	150	Do.	

Hygrometers.

The dry and wet bulbs were, as heretofore, read immediately on opening the screens, and the differences of the readings, with the apparent hygrometric conditions at the time, were noted, the result being in favour of much attention being given to keep the wet-bulb thermometers in good order at the various stations.

Notes of Inspection of the Stations.

Fort William, August 13th, 1895.—All the instruments continue to be kept in excellent order, and much attention is given to punctuality, accuracy, and fulness of detail in making the observations.

Fort Augustus, August 14th.—The instruments are in excellent order, and much care and attention are manifested by Father Martin in making the observations.

Nairn, August 15th.—The posts of the thermometer screen were strengthened with strips of wood in spring, the work being neatly and strongly done. The instruments were all in very good order, and Miss Penny and her brother are very desirous to secure accuracy in the observations and daily reports.

Stornoway, August 17th.—The barograph was altered as requested, so that it read with the reporting barometer at 32° and sea level. As the screw of the vernier of the reporting barometer was very loose, instructions were given to take the readings from the check barometer instead. This could readily be done, as the same "card" suits both barometers. The spare thermometer was found broken a year ago, when the instruments were removed to the new station. As parts of the thermometer screen were quite rotten, it was necessary to order a new one at once. The vane, which is 50 feet high, is in charge of the Harbour Commissioners, of whom Mr. J. McKenzie is one. It is kept in very good order.

The observations are made with the greatest care and with much intelligence; and the assistant, who is one of Mr. McKenzie's clerks, makes the observations and prepares the daily telegraph report correctly and expertly.

Strathpeffer, August 19th.—The instruments are all good at this new station, and have been compared at Kew. They have been placed in the best positions obtainable. Both Dr. I. Tregelles Fox and his son, who assists, read the instruments and do the reductions expertly and correctly.

Dunrobin, August 20th.—The instruments are in good order, and the observations are made correctly and with intelligence. Owing to the growth of some shrubs, the monthly rain-gauge will be removed to such a distance as will leave it unaffected by the shrubs.

Wick, August 21st.—A new Stevenson screen was added lately. As the roof is getting badly warped, owing to the thinness of the painting, orders were given to have it well painted at once. Its position is in the same plot of ground, 5 yards north of the old one, the two positions being virtually the same. The minimum thermometer was found with about 9° of spirit lodged in the top of the tube. This, I was assured, took place only a few days prior to my visit, and that meanwhile 10° had been added to each reading.

Otherwise everything was in very good order, and the observations are made and reduced in a most satisfactory manner.

Lairg, August 22nd.—The observer was from home, and all the thermometers were found broken, except the minimum one. No observations have been received from this station for about a year; but steps are being taken that the observations be resumed.

Aberdeen, August 23rd.—Everything here is in excellent order, and the observations are made with correctness and ability.

As regards the lateness with which telegrams are sometimes received from this station at this season, I am informed that the cause of delay is occasioned by the temporary change of the telegraph clerks during the Aberdeen holiday season; and the great press of telegrams during the herring fishery season.

Braemar, August 24th.—The instruments and work of observing continue in the same state of efficiency as on previous inspections.

Dundee, August 26th.—The instruments are well kept and attended to; and much care and intelligence is manifested in observing.

Machrihanish, August 27th.—The object of this visit was to advise in establishing a new station at this place. The barometer is a B.T. instrument with Kew comparison. The thermometer screen is a Stevenson's, at present set on the lawn without supports, which will be added

when certain contemplated changes on the grounds have been carried out. The present thermometers are not good, but a complete new set is to be ordered. The rain-gauge is the M.O. pattern, which will be placed near the thermometers in the new arrangements. Mr. Franklin Adams understands the methods of placing and reading the instruments, and of reducing the observations.

Ardrossan, August 29th.—Mr. Mayes was from home at the time of my inspection. The instruments are in very good order, and the observations are carefully and correctly made by the assistant in charge.

Glasgow Observatory, August 29th.—In September 1894 the barometer was removed from the transit to the computing room. The new position is very good and the height is unchanged. The anemometer has been placed 8 feet clear above the summit of the dome, on an iron lattice stand similar to what is used for railway signals. Everything is in excellent order, and the observations are all that can be desired.

Pinmore, August 30th.—The instruments are in particularly good order, and the observations are made with intelligence and enthusiasm.

Marchmont, October 1st.—As the posts of the Stevenson screen are rotten where they meet the ground, new ones have been ordered. Otherwise all the instruments are in very good order, and the observations made with care and intelligence.

Edinburgh, October 4th.—Everything at this station is well managed and kept, and the observations leave nothing to be desired. The rainfall pressure, temperature, and moisture of the air and sunshine are also observed with self-recording instruments.

Leith, October 8th.—The instruments are all in good order, well attended to, and well observed by the two observers.

Ochtertyre, October 10th.—All the instruments are in excellent order, and the observations leave nothing to be desired. A double and more extensive set of underground thermometers have been added at this station.

(Signed) ALEXANDER BUCHAN,
Inspector of Scottish Stations.

INSPECTION of the ENGLISH STATIONS.

October 14th, 1895.

SIR,

I BEG to submit the following reports of my inspection of the stations visited by me this year.

I am, &c.
(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

Scilly, August 27th.—The instruments generally were in good order, and the observer read them and prepared his telegrams correctly and quickly. I spent a good deal of time with him instructing him in the use of his self-registering aneroid, and I think his reports will show an improvement as regards the use of that instrument. The pen, however, is quite worn out, and a new one is badly needed; I mended the one in use as well as I could temporarily.

Newquay, September 3rd and 4th.—The sunshine recorder at this station has for some time past been badly attended to. I therefore tried to get for it another site, and to put it in charge of someone who would properly attend to it. For this purpose I called on the Mayor

of Truro, who is much interested in meteorology, and has a good deal of influence at Newquay, but he was absent from home. Eventually I arranged with Dr. Hardwick, F.R.Met.Soc., to take charge of it, and to place it on a site I selected close to its present position. Dr. Hardwick will, I am sure, attend to it well, but cannot take it over till October. In the meantime I readjusted the instrument in its present site, the wooden stand having decayed in places, and allowed the base to shift a little.

Plymouth, September 6th.—All the instruments here were in excellent order, and are well attended to by Mr. Prigg and his assistants. The barometer has recently been moved to the Hoe, adjacent to the other instruments, where it is placed in a very suitable room. I also visited the second rain-gauge, which is at Freedom Fields, in the northern part of the town, on high ground, and very well placed. The anemometer and the sea temperature observations, which the observer is trying to arrange for, are not commenced yet.

Prawle Point, September 7th.—The observer here had been changed since the last inspection, and I therefore went very carefully through all the routine of the work with him. He read the instruments fairly well, and, except as regards one small point, reduced the readings correctly. I found a misconception existed as to what was required for "extreme force." The thermometer screen badly needed repair, and I gave instructions for this to be done. The position of the rain-gauge was very unsatisfactory, and therefore I removed it to a better site lower down the hill. Generally there was a decided improvement shown over last year, and the observer appeared anxious to do his work satisfactorily.

Arlington Court, September 9th.—The instruments here were all in good order, and a great improvement was shown in the management of the wet-bulb.

Cirencester, September 10th.—Both Professor Ohm and the assistant who usually takes the observations were absent, but I found the instruments in good order, and the assistant I saw appeared to understand his work very well. Since last year the sunshine recorder has been secured by iron cramps.

Dursley, September 11th.—This is a rainfall station which had not previously been inspected. Unfortunately the observer was absent from home, and the groom, in whose charge the gauge was left, knew but very little about the matter. The gauge is not well placed, but I think a better site might easily be found for it, and from what I heard of Mr. Pinney I think he would readily adopt any suggestions made to him with a view to improving his observations.

Rochford, September 12.—This was another station which had not before been visited. The observer is very anxious to obtain more instruments, and to make his station one of the Second Order. At present he has only a rain-gauge and a self-registering aneroid, both in good order. I objected to the present site of the gauge in a kitchen garden, and it will be removed to a corner of the lawn, where it will have a better exposure.

Stokesay, September 13th.—Here the instruments were in fairly good condition, and the observations appear to be punctually and carefully made. A new thermometer screen is being made, and will soon be substituted for the dilapidated one hitherto used. The position of the

rain-guage is not altogether good, because of the plants and fruit trees which surround it.

Churchstoke, September 13th.—This is a sunshine station which had not been inspected before. The station is an important one, because it is the only one we have to represent a very large district. I found the recorder very badly placed near the ground level, and throughout the year a great deal of early and late sunshine must be cut off by trees and by the house. There is a high tower at the western end of the house on which the instrument at one time stood: its position there would be excellent, and I think if application were made to Mr. Wright he would have it replaced there.

(Signed) R. H. CURTIS.

Meteorological Office,
October 16, 1895.

SIR,

I BEG to submit herewith the report of my inspection this year of various English stations.

I am, &c.
(Signed) JOHN A. CURTIS.

To
R. H. Scott, Esq., M.A., F.R.S.

TELEGRAPHIC REPORTING STATIONS.

North Shields, September 12th.—I found the instruments in good order at this station. They are well attended to, and the observations appear to be carefully made. The rain-gauge has been repaired lately, but *this* instrument is old and badly worn, and a new one will be required before very long.

Spurn Head, September 6th.—A new lighthouse has been built here, which was to be opened within a week of the day of my visit. This necessitated the removal of the barometers, and I selected a position for them in the new lighthouse. The new height will be 28 feet above mean sea level, as determined from the building plan, and I satisfied myself that the difference, 9 feet, between the old and the new positions, is approximately correct. Neither the thermometer screen nor the rain-gauge will need to be removed. The great difficulty at this station appears to be from the fine sand of which the Head is composed blowing at times into the screen and rain-gauge, and thus affecting the readings. I see no way, however, of overcoming this difficulty consistent with a proper exposure of the instruments. I found the observer, Mr. G. Freeman, to be a careful, intelligent man, and a good observer.

York, September 9th.—Owing mainly to the growth of trees, the position of the thermometer screen was adversely reported on last year, and permission having been obtained from the museum authorities, I this year had it moved to a new site, selected—in consultation with Mr. Platnauer, B.Sc., the Keeper of the Museum—in the North Garden. I also had the two rain-gauges removed to a site close to the screen, where the exposure is much more open than in the old position.

The new site is shown on the sketch plan attached to my notes on the inspection. I determined the difference in height between the two positions to be, approximately, 5 feet, and the height of the rim of the rain-gauge will therefore be, above mean sea level 57 feet, above ground 1 foot.

The first observations taken at the new position were those for 6 p.m., September 9th, 1895.

I found everything in good order at this station, but I discovered that Mr. Wright, the observer, was in the habit of taking the 6 p.m. observations very soon after 5.30 p.m., which is his time for leaving work.

York, Sunshine Recorder, Botham, September 9th, 10th, and 14th.—I found this instrument out of proper adjustment, and in order to set it right I had to dismount it and reset it. This I did, levelling it by the slate base, and adjusting it correctly for latitude and meridian. I went again the next morning, when I found that the want of parallelism of the scorch was still very marked, and thinking this to be due to faulty level, I again dismounted the recorder, and again re-set it, levelling this time by the cusps of the bowl. I also attempted to fix the legs of the wooden stand to the roof with Portland cement, for while at work on the instrument I found a sensible change in the adjustment owing to the boy who was assisting me inadvertently knocking against one of the wire stays. September 14th.—I called again at York on my way from Newcastle to London, when I found from the cards taken off since my previous visit that the instrument was still not exactly adjusted. On making careful examination, I found that the glass sphere (which was cemented to the brass pillar) was not central in the bowl, but a tenth of an inch or more in error. To rectify this I should have had again to dismount the instrument, and, the sky being overcast, I feared that if I did so I should not be able, with the time at my disposal, to readjust it for latitude and meridian. I therefore made a slight change in level, in order, to some extent, to counteract the error in the centreing, and I recommend that on the next inspection a new stand be procured, and the instrument accurately fixed in position on it.

Stations of the Second Order.

Belvoir Castle, August 31st.—The observer, Mr. W. H. Divers, unfortunately was from home on the day of my visit. I saw, however, Mr. Ross, the deputy observer, who is the foreman gardener, and a very intelligent man. The barometer being in Mr. Divers' house, which was locked up, could not be shown me, but I examined the other instruments in the usual way. The thermometer screen is one of the "Glaisher" pattern, is painted a dull slate colour, and has bare soil beneath it. I asked that grass might be laid down under it, and that the screen be painted white; this it was promised should be done. The outfit at this station is good, and the observations are, I believe, made with intelligence and care, though great precision is not attempted. Cloud-form and weather is not regularly observed at present, but I hope the station will improve in this respect.

Durham, September 11th.—Everything was in excellent order at this station, except that the rain-gauge was rather loose. Mr. Carpenter promised to have the defect remedied, but the gauge stands on a post, and it is difficult to fix it quite firmly. The force of the wind has hitherto been obtained from a small dial anemometer fixed on the north-west corner of the observatory, the indications of which are converted into force by Beaufort scale by the Table in the Instructions. The results thus given, are, I believe, always below the truth, and in view of this, and of the fact that the observations as at present conducted are attended with difficulty, especially at night time, and sometimes with

no little danger, I recommend that Mr. Carpenter be requested to give the force of the wind by estimation only in future.

Newcastle-on-Tyne, September 12th.—The equipment of this station is exceedingly good; the thermometers and rain-gauge are, however, exposed on a flat roof, 41 feet above the ground, and owing to the business arrangements the evening observations have to be taken at 6 p.m. instead of 9 p.m. Both these difficulties appear to be insuperable, but to meet, in some degree, the first, I suggested to Mr. Martin to try and arrange for a thermometer screen and rain-gauge to be set up in some allotment ground quite close to the station, for the purposes of comparison. This he promised to do.

The observations are most carefully taken by Mr. Robinson, one of Mr. Martin's trained assistants, and great interest is manifested in the work.

Fulbeck, near Grantham, September 2nd.—This has hitherto been a rainfall station simply, but the observer, Rev. Vere F. Willson, M.A., is about to obtain the outfit for a station of the second order, when he will be able to furnish us with complete observations at 9 a.m. and 9 p.m. I selected positions for the barometer and the thermometer screen; the rain-gauge is very well exposed at present on the edge of the lawn. The station is situated on the southern slope of the table-land known as Lincoln Heath, and is about 100, or perhaps 150 feet, below the top of the Heath. The station promises to be a very good one, and I recommend that it be accepted as one of the Second Order.

Seaham Harbour, September 11th.—Since the last inspection the thermometer screen has been moved to a new position then selected for it. The change is a great improvement, the old site having become overgrown with small trees and shrubs. On the day of my visit cabbages were growing under the screen. These I had removed, and it was promised that grass should be laid down instead. Mr. Leith is a very intelligent observer, who reads the instruments carefully and well, and takes a great interest in the work. His estimate of cloud and wind agreed with mine, as did also Mr. Aird's.

Tealby, September 4th.—I found the instruments at the station in good order. The rain-gauge has been lowered by about 2 feet, but the readings will not be adversely affected by the change. I roughly checked the height of the barometer from the B.M. on the church, and found it to be correct.

Uppingham, August 31st.—The thermometer screen was moved to a new position on January 1st, 1895. The exposure is now decidedly better than it was. I found everything in excellent order at this very well-managed station, but Mr. Mullins is somewhat concerned as to the continuance of the station in the—not improbable—event of his leaving Uppingham.

York, September 9th.—As explained in other report, I transferred the thermometer screen and rain-gauges to a new site, selected in consultation with Mr. Platnauer, B.Sc., in the North Garden. The new position is about 5 feet higher than the old one, and much better in every way. The rain-gauges are now placed at 1 foot above ground. The first observations at the new station were taken in the evening of September 9th. I found the instruments in good order at this station.

Stations of the Third Order.

Alnwick Castle, September 13th.—Mr. Willyams was in Scotland at the time of my visit. I saw, however, the clerk who usually takes the temperatures and always sends off the return to the Meteorological Office. I was assured there will be no difficulty in having supplied to the Office the temperatures from the Stevenson screen in the garden instead of, as at present, from the "Six" thermometer outside the library window.

The thermometers in the screen are very good instruments, but the rain-gauge is almost worn out.

Bawtry, Hesley Hall, September 3rd.—The maximum and minimum thermometers were in good order. Their errors are not large, but they are of opposite signs. As last year, I found the wet-bulb out of order, and though the observations from this instrument are not supplied to us, I remounted it and gave instructions for the future. The rain-gauge had a hole in its side, which I repaired, so that its indications may now be relied upon.

London, Stamford Hill, October 9th.—This station supplies rainfall values only. The gauge is exposed in a small garden, which is well open to the southward, but considerably sheltered to the northward by houses of about 35 feet to 40 feet in height. The gauge is a 5-inch bottle gauge, and the rim cannot be firmly fixed. The station is not all that can be desired, but in view of the fact that we get no other returns from North London, I think it should be continued.

Market Rasen, September 4th.—The rain-gauge was loose in the ground, owing principally to the top fitting very tightly, and requiring some force to remove it each day. This stiffness was due to an irregularity in shape, which I corrected as far as I could. I also wedged up the gauge, and left it quite firm, but it probably will work loose again before next inspection. A new measuring glass has been obtained.

Northallerton, September 10th.—The new position of the rain-gauge, which is that I selected last year, is very satisfactory, but I found the gauge sunk too far in the ground, and it was also out of level. Mr. Stead promised to have it raised at once to 1 foot above ground, and to take care it was properly levelled. The defect in the measuring glass mentioned last year has now been remedied by a correct scale on paper being pasted over the etched scale. I tested this and found it correct.

Skipton, September 7th.—This is a new station, not yet formally accepted. The observer, Mr. W. Ecroyd, has provided himself with an outfit of excellent instruments, which are well exposed, and I think likely to be well attended to. The station is at Marton House, about 4½ miles south-west of Skipton, in a hilly country, but on nearly the highest ground in the neighbourhood. There are a good many trees about, but I do not think the observations will be much affected by them. I recommended the observer to change the position of the barometer, and this he promised to do. I also advised the removal of the small dial anemometer to the gable of the greenhouse and the erection on the same gable of a new wind vane, which Mr. Ecroyd has had prepared. At present, 9 p.m. observations cannot be supplied, but in spite of this fact I recommend that the station be accepted.

Barometer Comparisons, 1895.

Stations.	Inspector's Standard corrected (Adie, M.O. 590).	Reporting Barometer uncorrected.	Check Barometer uncorrected.	Reporting Barometer. Correction required to reduce to Inspector's Standard.	Reporting Barometer. Correction hitherto used.	Remarks
Durham	29·176	29·175	—	+·001	—	
Fulbeck	·730	·740	—	+·040	—	New instrument will be obtained.
Newcastle-on-Tyne.	·789	·788	—	+·001	—	
North Shields	·896	·880	29·885	+·015	—	
Seaham	·425	·436	—	−·011	—	
Skipton	29·485	29·484	—	+·001	—	
Spurn Head	30·208	30·189	30·196	+·028	—	
Tealby	29·881	29·868	—	+·013	—	
Uppingham	29·745	29·730	—	+·015	—	
York	30·008	30·004	30·004	+·004	—	

Thermometer Comparisons, 1895.

Corrections to be applied to the following readings of—

Stations.	Standard corrected (Negretti & Zambra B. T. 4992).	Dry Bulb.	Wet Bulb.	Spare Therm.	Max. Therm.	Min. Therm.	Grass Min.	Remarks.
Alnwick Castle	56·0	—	—	—	+0·5	+1·0	—	Sixes.
	57·8	−0·1	−0·2	—	0·0	+0·5	—	
Bawtry (Healey Hall).	70·3	+0·3	−0·1	—	−0·3	+0·4	—	
Belvoir Castle	60·1	+0·1	0·0	+0·3	+0·4	+0·2	+0·8	Spare ther. is min. No. 75122.
Durham	56·3	−0·3	−0·3	—	−0·3	+0·5	+1·6*	*1° of separated spirit, which is allowed for.
Fulbeck	62·6	—	—	—	+1·7	0·0	—	New ther. since obtained.
Newcastle-on-Tyne.	59·8	0·0	0·0	—	+0·2	+0·5	—	
North Shields	60·8	0·0	−0·1	—	−0·4	+0·6	—	
Seaham	57·3	−0·7	−0·7	—	−0·1	+0·8	—	
Skipton	—	—	—	—	—	—	—	New instruments with recent Kew certificates.
Spurn Head	60·6	−0·2	−0·4	+0·3	+0·5	+0·5	—	Spare, No. 3836.
Tealby	57·3	−0·1	−0·3	−0·3	−0·9	+0·2	—	
Uppingham	64·9	0·0	−0·1	—	−0·2	−0·2	—	
York	64·6	0·0	−0·1	—	0·0	+0·8	—	Maximum and minimum for Second Order return.
					+0·1	+1·0	—	Ditto for Telegraphic Reports.

(Signed) John A. Curtis.

I have the honour to submit the following report of the stations inspected by me in the year 1895.

(Signed) W. Clement Ley.

Telegraphic Reporting Stations.

Jersey, May 20th.—I found the instruments at the station at St. Aubin's in fairly good order, with the exception of the wet-bulb, which was considerably crusted. A mast, from which water formerly dripped at times into the rain-gauge, had been removed. The observations are, I think, in the main, well maintained.

The sunshine recorder, at St. Heliers, appeared to require a small re-adjustment, about which I gave full instructions.

Hurst Castle, May 22nd.—The present observer had made occasional mistakes in barometric readings, and also in reductions. He read the barometers very correctly on the occasion of my visit, but his readings of the thermometers were somewhat rough. The rain-gauge having been moved nearer to the centre of the garden, has now a good exposure, and was firmly fixed. The wet-bulb was not quite clean. The Stevenson's screen had been repainted. The supports, however, had become weak and decayed, and I ordered new ones. Strong winds at this station may probably have been over-estimated, but the observer's estimate of light winds appeared to be correct.

Dungeness, May 27th.—The wet-bulb at this station was somewhat crusted, hard water having been employed for it. The screen required repainting, which I ordered. The instruments were correctly read by the light-keepers on the day of my visit, and I think that the manner in which the observations are taken at this station indicates improvement, although errors are still occasionally noticed. Mr. Batten, who is responsible for the reports, estimated the wind force as three, when it should, I consider, have been reported as two, during part of the time I was at the station.

Cambridge, May 30th.—The instruments were all in very good order, but the maximum thermometer reads high, and no correction is applied at the station. The wet-bulb was clean and well-mounted. The observations are, in my opinion, very carefully conducted.

North Foreland, June 14th.—The observer, Mr. Cox, had just left the station on leave on the day of my visit, and I was unable to obtain any information as to the check barometer, which was said to be at No. 1, Alexandra Road, Broadstairs, where I called. The deputy observer at the station set the vernier very much too low. I gave full instructions. There was some deposit of lime on the wet-bulb. The rain-gauge was not quite horizontal; this I rectified. No change has been made in any of the instruments, excepting in the maximum thermometer, 1645, which was new. There appears to have been some over-estimation of gales, particularly from the north; but I have no doubt that northerly winds are felt with somewhat exceptional violence at the station. The wet-bulb was properly mounted, and the reservoir had been placed near enough to the bulb. The thermometers were correctly read by Mr. H. Brown, the deputy.

Stations of the Second Order, Weekly Weather Reporting Stations, &c.

Southampton, May 19th.—The returns from this station continue to be of very excellent quality. Mr. Cook had been ill just previously to

my visit, but the deputy observer had maintained the work satisfactorily. All the instruments were in excellent condition.

Parkstone (*Bournemouth*), inspected May 23rd.—All the instruments were in good order, and the observations are conducted, as usual, with much care and accuracy.

Eastbourne, May 24th.—The wet-bulb at this station was mounted with much too thick material. All the instruments were otherwise well kept, and all have an excellent exposure. The observer is a little uncertain in his readings of the instruments, and is somewhat self-confident and impatient of instruction.

St. Leonards, inspected May 25th.—The thermometers at this station were, as usual, by no means carefully attended to, the hygrometer being especially dirty, and the muslin not appearing to have been changed for a long period. The thermometer screen was extremely dirty, and in some need of repair. I think the attention bestowed on the instruments is very inadequate. The head gardener at the Gensing Gardens, who is deputy observer, read the thermometers pretty correctly, but he did not appear to have received sufficient instruction as to the care which should be devoted to them.

I found the sunshine recorder at the Hastings Waterworks to be out of level, which had, I think, led to the supposition that the longitude correction was wrong. Mr. Farnham, who attends to the instrument, was absent from home. I wrote to him, and enclosed his reply to the *Meteorological* Office.

Bramley (*Guildford*), visited May 29th.—The instruments at this station, most of which are those formerly employed at Chilworth, were in fair condition. The minimum, with the Kew correction, reads much too low; the observer had, however, been in the habit of applying a correction of + 1°·1 throughout the scale, which was, at 56°, rather too high a positive correction. The screen somewhat required repainting, which the observer promised should be done. The winds experienced at the station are decidedly, to a considerable extent, deflected by neighbouring hills. Care is evidently taken with the observations, and the station, in my opinion, promises to be a useful one.

Geldeston (*Beccles*), visited June 1st.—As usual, the observations at this station continue to be admirably taken, and the instruments were all in the most excellent order.

Epsom, inspected June 5th.—The observations at this station continued somewhat unsatisfactory, the returns not being very well entered, and the whole work being, apparently, somewhat roughly done. The barometer is now in a much better light than formerly, but it was not very accurately read by the boys who were in charge of the instrument. The wet-bulb was again very badly mounted, and the wrong kind of material had been employed for it. I gave full instructions, and have hopes that there will be improvement in the future. The grass minimum had as much as 2°·8 of alcohol detached, which had, strangely, escaped observation. This was restored, and orders given that the instrument should be frequently examined in future.

Chester, October 25th.—This is a new, and promises to be a very useful station. The observations are excellently taken and the return very well filled in. The equipment is very good. The observer, Rev. J. C. Mitchell, expressed his intention of adding a sunshine recorder, for which, however, the exposure will not, I think, be adequate.

Prestwich, October 27th.—The instruments, including the sunshine recorder, have now a most excellent exposure. The attendant in charge of them did not, however, read them with perfect accuracy, and made an error of ·05 in his first reading of the barometer on the day of my visit. The rain-gauge was loose, but Dr. Clunn undertook to have it fixed in a block and its horizontality more carefully attended to. The weather is not very fully recorded, and the observers have no time for hygrometrical reductions, yet, on the whole, the observations appear to be fairly good, and there is no likelihood of any breach of continuity.

Manchester, visited October 28th.—The observations seem to have been carefully taken, with the exception of the hygrometrical observations, especially during frost, about which I gave full instructions. The wet-bulb was by no means clean. The barometrical and hygrometrical reductions are carried out by Mr. Ross, clerk to Dr. Niven, the medical officer of health, at the Town Hall, apparently correctly. Hitherto only 9 a.m. observations had been taken, but Dr. Niven expressed an opinion that the corporation would consent to pay for 9 p.m. observations a sum which I found Mr. Hazzlewood, the observer at Oldham Road, would accept for the work.

Some amount of sunshine is cut off from the Jordan's sunshine recorder by buildings when the sun is near the horizon, especially in the morning.

St. Helen's, visited October 26th and 28th.—The instruments at this station were all in good order, but the corporation had objected to laying down grass under the thermometer screen. Here, also, evening readings had not hitherto been taken, but Dr. Robertson, the medical officer of health, who undertakes the observations, was of opinion that the corporation would probably consent to make a grant for this work, which would be carried out by the deputy observer, who resides in the park where the instruments are kept. The barometrical reductions are made by a clerk at the Town Hall. There is every prospect of permanence in the observations taken at this place.

Heysham Hall (*Morecambe*), October 29th.—The instruments at at this station were all in good order, and appear to be well attended to. A strip of turf, somewhat too narrow, had been laid down under the thermometer screen. There has been some doubt as to the exact level of this station. Levelling from a bench mark at no great distance, I to-day made out the altitude to be 80·5 feet above M.S.L., which pretty nearly agrees with the level as previously determined by aneroid comparisons made from the same bench mark, but does not quite agree with the level as deducible from the barometric returns sent in to the Meteorological Office. The observer has been, I believe, in the habit of reading the barometer too low. He did not, however, do so on the day of my visit, but he reads the instrument with no great amount of accuracy. No reductions are made at the station.

Gilcrux (*Maryport*), inspected October 30th.—This is a new, and promises to be a useful station, if the observer will undertake 9 o'clock instead of 8 o'clock observations, which he seemed willing to do. The observing barometer is a very good one, the check barometer not reliable. There is a large outfit of thermometers, which were all in admirable condition, and were very accurately read by the observer. The wind-force was somewhat over-estimated by him on the day of my visit.

Hawes Junction, October 31st.—The minimum thermometer had 1°·2 of detached spirit in the upper end, which had escaped observation.

I restored this, and gave instructions that the instruments should be frequently examined. The other instruments at this high level station, which I had not for several years inspected, were found to be in good order. The observer set the vernier of the barometer ·006 too low on the occasion of my visit. The observations appear to be, in the main, well kept up. The thermometer screen is 2·5 feet above the level of the old one, for which it was substituted two years ago.

Sheffield, inspected November 1st.—I found the thermometers at this station, where the atmosphere is extremely smoky, by no means clean, and the wet-bulb, for which rainwater had not been regularly employed, was much crusted. Mr. Howarth undertook that my orders on these points should be carried out. He further stated that application should be made to the Museum Council for a sunshine recorder, for which there is a very fair position. The evening readings are now taken by a night watchman.

Solihull (*near Birmingham*), November 2nd.—The instruments at this new station are good, but I found the observations to be at present taken in a somewhat perfunctory manner, and the observer in his first reading of the barometer made a large error. I gave full instructions, but I do not feel sure that the work will be conducted so as to be of much value.

At the stations inspected in May and June the standard barometer, 590, and the thermometers, 4992 and 4994, were employed by me for comparisons. At the stations inspected in the autumn an aneroid only, and the thermometers, 5030 and 5031, were used. The following table shows the discrepancies between the barometric readings of the different observers and those taken by myself, the corrections which were needed for the thermometers to reduce them to the standards employed, the condition of the hygrometers, and the general condition of each station :—

Name of Station.	Barometers. Difference of Observer's from Inspector's Readings.		Thermometers.									
	Reporting Barometer.	Check Barometer.	Temperature of Water.	Dry Bulb. Correction to reduce to Inspector's Standard.	Wet Bulb. Correction to reduce to Inspector's Standard.	Difference of Wet from Dry Bulb.	State of Hygrometer.	Maximum. Correction to reduce to Inspector's Standard.	Minimum. Correction to reduce to Inspector's Standard.	Spare. Correction to reduce to Inspector's Standard.	General Condition of Station.
	°	°	°	°	°	°		°	°	°	
Bramley - - -	−·002	—	56·	−0·1	−0·2	+0·1	A	−0·1	+0·7	—	B
Cambridge - - -	+·001	—	61·	−0·4	−0·3	−0·1	A	−0·9	+0·2	—	A
Chester - - -	+·001	—	49·	+0·1	+0·1	0·0	A	−0·6	+0·5	−0·1	A
Dungeness - -	·000	−·002	53·	0·0	−0·1	+0·1	B	−0·1	−0·1	—	B
Eastbourne - -	+·001	—	58·	−0·1	−0·2	+0·1	B	−0·1	0·0	—	B
Epsom - - - -	+·004	—	60·	−0·2	0·0	−0·2	C	+0·1	+0·1	+0·1	C
Geldeston - -	+·001	—	60·	−0·1	−0·2	+0·1	A	−0·4	+0·1	−0·2	A
Gilcrux - - -	−·001	−·005	44·	+0·1	+0·1	0·0	A	+0·3	+0·1	−0·2	A
Hawes Junction - -	−·006	—	40·	−0·2	−0·4	+0·2	A	−0·2	−0·2	—	B
Heysham Hall - - -	+·002	—	47·	−0·2	−0·1	−0·1	A	−0·2	−0·1	−0·1	B
Hurst Castle - -	−·001	·000	55·	−0·3	−0·2	−0·1	B	−0·3	−0·3	—	B
Jersey - - - -	−·002	·000	56·	−0·5	−0·5	0·0	B	−0·3	+0·1	−0·3	B
Manchester - -	+·004	—	48·	0·0	0·0	0·0	B	−0·1	0·0	0·0	B
North Foreland - -	−·021	—	55·	−0·4	−0·1	−0·3	A	+0·7	0·0	—	B
Parkstone - -	−·002	−·001	65·	−0·2	−0·2	0·0	A	−0·4	+0·3	—	A
Prestwich - - -	−·050	—	51·	−0·2	0·0	−0·2	A	0·0	−0·1	−0·3	B
St. Helens - -	+·002	—	43·	+0·1	0·0	+0·1	A	0·0	0·0	—	B
St. Leonards - - -	·000	—	61·	−0·5	−0·5	0·0	C	0·0	+0·1	—	C
Sheffield - - -	+·002	—	42·	−0·2	−0·3	+0·1	B	0·0	0·0	—	B
Solihull - - -	−·020	—	53·	0·0	+0·1	−0·1	B	+0·1	0·0	—	C
Southampton -	·000	—	57·	−0·1	−0·1	0·0	A	−0·6	+0·2	—	A
Yarmouth - - -	−·002	−·002	64·	−0·5	0·0	+0·5	A	−0·4	+0·1	—	A

(Signed) W. Clement Ley.

SIR, October 14, 1895.

HEREWITH I beg to submit reports of my inspections of the anemometers at Scilly and Holyhead.

I am, &c.

R. H. Scott, Esq., F.R.S. (Signed) R. H. CURTIS.

Scilly, August 20th–27th.—*Robinson Anemometer.*—I found this instrument in a fairly satisfactory state, and working well. I took it entirely to pieces, and cleaned it in every part. The brake-box had an insufficient supply of oil (asbestoline) in it, and what was there had thickened a good deal, and become unsuitable. I also found that the asbestoline had dried into a hard film over some portions of the instrument where it had been for some time undisturbed, and that on other portions it had become viscid and nearly useless as a lubricant. In re-filling the brake-box, and for lubricating the instrument generally, I now used a mixture of asbestoline and paraffine.

I drilled out a broken screw, and supplied two new screws to the cover of the box containing the reducing gear; and I had a great deal of old paint scraped off the outside of the instrument preparatory to its being repainted.

The clock had a great deal too much loose oil about it, and I cautioned the observer against using oil so freely to parts which needed but little or none. The clock was taken to pieces and cleaned, and when set up again worked very satisfactorily.

The silver pencils fitted last year have proved satisfactory.

Since the cleaning the instrument has, up to this date, continued to work very well.

Dines' Anemometer.—I erected one of these instruments by the side of the Robinson instrument, and placed the recording portion in the hut at the foot of the stone pillar on which the latter stands, after enlarging the hut for the purpose.

I placed the vane on the top of three lengths of iron "barrel," which had been used for a similar purpose at the Meteorological Office. The "barrel" was screwed together, and was secured by three iron struts fixed to the pillar and to some stout pieces of timber, and also by wire stays from near the top to blocks of granite firmly bedded in the ground. The soft-metal tubes were led down inside the barrel to protect them from damage.

The height of the vane above the ground is 32 ft. 6 in., and as the instrument stands on relatively high ground, the exposure is perfectly free and open in every direction.

I explained to the observer the construction of the instrument, and method of dealing with it. Since I left Scilly he has had some trouble in getting the pen to act properly, but he has been written to, and his subsequent traces show considerable improvement.

I should like to acknowledge the courtesy of T. A. Dorrien Smith, Esq., of Tresco, who kindly allowed me to take freely from an adjacent quarry any stone I required, and offered to assist me in any way he could.

Holyhead, September 16th–25th.—*Robinson Anemometer.*—This instrument had, as usual, been well looked after during the year, but on taking it to pieces I again noticed that the asbestoline had not proved very satisfactory. The whole of the external portion of the instrument was dismounted, and carefully examined and cleaned. One cup had become quite loose, and another was weak, so both were re-soldered and made secure.

The old recording apparatus was removed, and returned to the Meteorological Office, and a new one, which had been sent by Munro, together with new coupling rods, was substituted for it. As this new portion was somewhat smaller than the apparatus it superseded, some contriving was required to adapt it to the other portions. I found also that originally the recording apparatus had been placed centrally in the room, but not vertically under the shafts, and this involved shifting the stand on which it was placed.

The instrument was got into good adjustment, and up to this date it has continued to work satisfactorily. There is a small "kink" in one of the silver pencils, which I did not venture to interfere with, especially as I think it likely to become less marked after it has had a little wear. I had had the time pricker placed exactly two hours in front of the pencils, and this was found to greatly facilitate the placing of the sheets at starting.

I tested by compass the points used for setting the vane, and finding them not quite correct, I substituted others, which will be used in future.

I append some views of the lighthouse and pier on which this anemometer is erected (not reproduced); they show how the free exposure of the instrument is interfered with, and tend to make clear the points to which I referred in my memorandum on this subject submitted to the Council March 19th, 1895.

Bridled Anemometer.—The hut, upon the roof of which this instrument is placed, had been shifted to the extreme northern end of Salt Island, where it is erected upon a stone foundation about 3 feet above the ground level.

I examined every part of the instrument, and cleaned and lubricated it thoroughly. The wire cord substituted last year has been found to work very satisfactorily, and is a great improvement upon the hempen cord previously in use. After the instrument had been set up I again tested it for the zero of the scale, using the same method I adopted last year, but on this occasion loading the pulleys with the ordinary and also with the gale loads. I found that the pen needs a slight modification in order to prevent it from swinging out from the paper when moved quickly by sudden gusts of wind, by which the trace is broken, and the ink oftentimes jerked out of the pen. I took measurements for the purpose of having a new holder made, which should prevent this in future.

When re-erected the instrument worked very satisfactorily, and in its new position it should give very good results.

Dines' Anemometer.—This instrument I erected on galvanised iron barrel, as at Scilly, stepping it upon an iron pin fixed in a block of stone which was bedded in concrete at the north-west corner of the bridled anemometer hut; the barrel was kept about 3 feet away from the hut, so that it should be as far away as possible from the cups of the bridled instrument. The barrel was fixed by means of two rigid iron stays, gripping the lower lengths of the barrel and secured to the hut, and also by four wire stays from just below the head to the ground. The composition tubes were brought down inside the barrel, and between the barrel and the hut are protected by a wooden cover. The recording portion was placed upon a stand fixed to a corner of the hut. The height of the vane above the ground is 44 feet.

The construction and management of the instrument was thoroughly explained to Mr. Cotton, and to his assistant, who will have the immediate charge of it, and the curves subsequently received show it to be working very satisfactorily.

(Signed) R. H. Curtis.

Reports on Inspections of Observatories, &c.

Radcliffe Observatory, Oxford, visited September 26th.—All the instruments were found in good order and working satisfactorily.

Squeezes were taken of the self-recording and check rain-gauges, and are sent herewith.

A comparison at 63¼° F. with my Kew standard gave the following correction for the several thermometers specified:—

Dry-bulb standard, No. 576 (in thermograph screen)	−0·1
Wet-bulb „ No. 575 „ „ -	−0·15
Dry thermometer, B.T. 1710 (in Stevenson screen) -	−0·2
Wet „ B.T. 1709 „ „ -	−0·15
Maximum thermometer, M.O. 356 - - -	−0·5
Minimum „ M.O. 363 - - -	0·0
Grass minimum thermometer, M.O. 70852 - -	+0·1

Kew Observatory.—The several instruments have been examined and cleaned as usual.

An attempt has been made to test the trustworthiness of the vane on the Robinson anemograph by comparison with a flag carried by a flagstaff on the Observatory roof. A large number of observations have been made, but hitherto without that accordance between the results necessary for the passing of any final judgment.

(Signed) Charles Chree.

Kew Observatory, October 29th, 1895.

Yarmouth, July 20th–21st.—The anemometer here was found to be in good order, and apparently carefully attended to.

The weather at the time was wet and unsettled, and it was difficult to do very much outdoors, but I managed, during the intervals, to examine and clean most of the exterior parts of the instrument.

The direction fan-spindle seemed to be working a little stiffly; this was eased.

The orientation was tested before disturbing instrument, and again when it was re-started, and was satisfactory in each case, and the check lines will be found on anemograph curves 201 and 202.

North Shields, July 22nd–24th.—The instrument here was working well, and appeared to be sufficiently lubricated.

All parts were dismounted and overhauled, but examination failed to reveal any apparent cause for the peculiar velocity traces during the very severe cold of last winter, excepting that I found a little water had got into oil cup at top of shaft, the back nut having worked slightly loose, and, to prevent a recurrence, I had the nuts sealed with red lead.

Captain Harrison arranged to have the instrument oiled and oriented monthly, and to give special attention in very cold weather.

The orientation was examined both before and after dismounting anemometer, and was satisfactory. The check lines will be found on curves 204 and 205.

The "worm" on the direction fan-spindle is worn dangerously thin.

Alnwick Castle, July 25th–26th.—The defective direction-fan referred to in last year's report was taken down immediately after my visit then, and a complete new set of fans, worm spindle, and bearings was fitted up on September 1st.

The working certainly seems improved, but owing to the length of shafting in use the direction must always be rather sluggish.

The usual examination, oiling, &c. was given, but the instrument generally was in good order.

I looked through a number of curves, and found that the copies sent to the Office are correct, as the velocity trace overlaps the printed scale on sheets both at top and bottom.

I failed to find anything apparently wrong with the edge of "pencil" which would account for the slight wobbling of trace, but I eased and lubricated the end of the shafting and gearing, and the traces may perhaps be better now.

A sheet showing the "orientation" is forwarded with this report.

Glasgow, July 27th–30th.—*Barograph* and *Thermograph*.—These instruments were in very fair order, but the clock escapements required cleaning and oiling, which was done, and the lenses and mirrors carefully wiped.

The muslins and threads on the wet-bulb thermometers were rather dirty, and it was promised that they should be changed more frequently.

The standard barometer has been shifted to a more favourable position near a good light in the computing room, and I was informed that full particulars had been sent to the Office.

Anemometer.—The new position of this instrument renders the work of examination, &c. somewhat difficult and risky, but with the aid of Dr. Becker's assistants I managed to dismount and thoroughly overhaul all parts.

The oil in the container in which the direction rollers work was very thick and dirty; all was removed, rollers and collar washed in paraffin, and the container refilled with new asbestos lubricant.

The orientation was tested before and after taking down instrument, and the sheet showing same accompanies this report.

Rain-gauge.—This was dismounted and cleaned, and a new clock line fitted, as the old one was nearly cut through at the barrel-eye. Instructions were given to revolve cylinder for a datum-line each day before starting a curve.

The thermometers were compared at 56° F. with Kew standard, No. 720, and the following corrections determined :—

Dry-bulb thermometer,	No.	708	−0°·1
Wet-bulb	„	711	−0·0
Maximum	„	58846	+0·1
Minimum	„	63942	−0·0
Attached thermometer (to barometer)—		no number	−0·6
Grass minimum thermometer,		No. 59003	−0·1

The zero-lines values are not yet determined, but the figures on scales are—

Dry-bulb, M.O. 199	10° = 0·634 inch
Wet-bulb, M.O. 201	10° = 0·602 „
Barograph, M.O. 197	1 inch = 1·551 „

Fort William, August 1st–2nd.—*Barograph* and *Thermograph*.—These were in good order. The clocks were taken down, cleaned, and lubricated, and lenses and mirrors cleaned. The rain-gauge was also lubricated, &c., and instructions were given to trace a zero-line on curve each morning, by revolving cylinder, before starting.

Comparisons of the thermometer at 56° F. with Kew standard, No. 720, gave the following corrections :—

Dry-bulb thermometer,	No.	671	−0°·0
Wet-bulb	„	672	−0·2
Maximum	„	M.O. 1092	−0·0
Minimum	„	M.O. 1322	+0·5

The zero values of the thermograph are—

	Dry.	Wet.
Upper - - - - -	79·3	77·5
Lower - - - -	16·0	17·4

The values on ivory scales are—

Dry-bulb - - - -	10° = 0·670 inch.
Wet-bulb - - -	10° = 0·695 „
Barograph - - -	1 inch = 1·542 „

Mr. Omond is of opinion that a slightly different value for the wet-bulb zero-line would lead to closer agreement between the eye observations and the tabulated readings.

Deerness (*Orkney*), August 6th–7th.—I found the anemometer here in good condition, and evidently carefully attended to.

All parts of instrument were dismounted and thorougly cleaned.

The oil was very clean and fluid.

The velocity pencil was marking considerably above the zero-line at commencement of curves. I was able to improve this, and the sheet sent with this report bears a series of traces made by revolving the velocity spiral at the beginning, middle, and end of the paper, and these traces will be found to run more within the range of the printed scale.

The orientation markings, which were satisfactory, are also on the same sheet.

Aberdeen, August 10th–13th.—The *Anemometer* here was in very fair order, but the opportunity was taken of a dry, calm day to thoroughly overhaul and clean it, and to replace the old oil (which was fairly clean) with fresh sperm.

Orientation was good, and the sheet showing the check traces is appended to this report.

Rain-gauge.—This instrument and its clock were cleaned, and instructions given for making a datum-line on each curve. An ash tree about 6–8 feet away, on the east side, is rapidly growing, and will soon shelter gauge.

Barograph and *Thermograph.*—These instruments were in a satisfactory condition, but the clock escapements were improved by cleaning and lubricating.

The thermometers in use were compared at 60° F. with Kew standard, No. 720, and the following found to be the corrections required :—

Dry bulb thermometer,	No. 397	- -	−0°·10
Wet-bulb „	„ 395	- - -	−0·65
Maximum, „	M.O. 1002	- - -	+0·10
Minimum, „	M.O. 89	- - -	+0·30

The "zero" values in use are—

	Upper.	Lower.
Dry-bulb - - - -	81·4	23°·0
Wet-bulb - - - -	79·3	15·8

Values on ivory scales are—

Dry-bulb - -	No value or number.
Wet-bulb - -	10° = 0·700 inch. M.O. 184.
Barograph - -	1 inch = 1·578 „

(Signed) E. G. CONSTABLE.

Kew Observatory,
October 28th, 1895.

(M.O. 2001.)

R. H. Scott, Esquire, F.R.S., Kew Observatory,

DEAR SIR, November 6th, 1895.

I BEG to submit the following report to the Meteorological Council as to the condition of their self-recording instruments at the various observatories and anemograph stations inspected on the days named :—

Falmouth, October 1st–4th.—At this observatory all the instruments were in good working order, and the photography was excellent.

On dismounting the anemometer the lubricant in the direction well was found in a very satisfactory state. All parts, however, were cleaned, and the bearings supplied with fresh asbestos lubricant. Several blades in the direction fans were discovered loose, but these I had soldered and made quite fast before remounting the instrument.

The cups and stays show no perceptible signs of wear, but advantage was taken to paint them while dismounted.

The clock and recording parts were also examined and cleaned, and the orientation duly tested; the paper showing the result is attached to this report.

Since my last visit to Falmouth (October 1890), I notice that a good number of houses have been erected on the land adjacent to the observatory, in the direction from N.E. to S.E., so that winds from that quarter might be somewhat affected by the buildings; otherwise the exposure of the anemometer from north through west and south to south-east is very good indeed.

The clocks of both barograph and thermograph were taken to pieces and cleaned, also the lenses and condensors received due attention. Afterwards the various thermometers were examined by means of Kew standard thermometer, No. 720, and found to have the following corrections at 60° :—

Dry standard, 383	—0°·5
Wet „ 388	—0·3
Maximum, M.O., 104	—0·5
Minimum „ 308	0·0
Barograph thermometer (no number)	—0·8
Standard barometer, attached thermometer (no number)	—0·9

NOTE.—Mr. Kitto does not apply any correction to the attached thermometer of the standard barometer. I would suggest that he be advised to apply the correction as soon as possible.

As regards the rain-gauge, the clock was taken to pieces and cleaned, and "squeezes" were obtained of both the self-recording and spare gauges.

Mr. Kitto was asked to revolve the cylinder each morning, so as to obtain a zero-line before starting the instrument.

Two old disused thermograph ivory scales, and an old inch scale, are returned herewith.

Mountjoy Barracks, Dublin, October 7th–8th.—The anemometer here was found working satisfactorily, and the lubricant in the ball bearings was in a fairly good condition.

I had the instrument taken down, and cleaned the external parts, and then added fresh oil to all the bearings. After remounting, the orientation was examined, and the observer instructed (through Colonel Kirkwood, R.E.) to orientate the instrument once a month, and forward the sheet to the Meteorological Office.

The clock was taken to pieces and cleaned, and the recording parts of the anemometer were examined, and all bearings oiled.

Valencia, October 10th–14th.—Here all the instruments were in good order.

The barograph and thermograph clocks were cleaned, as well as the lenses and condensers, and the position of the zero dots was changed to winter values. Some difficulty was experienced in getting the thermograph clock to go correctly after cleaning. After repeated trials, it was found that the bearing holes into which the pivots of the escapement fitted had become so worn that the escape wheel at intervals slipped a tooth, and in consequence the clock gained a good deal. This I had put right by a local watch maker, and at the same time had the position of the pallets slightly altered by means of a brass washer, which improved the beat of the clock.

The thermometers were compared with the Kew standard, No. 720, and the following corrections determined at 55° Fahr. :—

Dry standard, 399	−0°·7
Wet „ 473	−0·4
Maximum, M.O. 1003	−0·1
Minimum, M.O. 2497	+0·1
Standard barometer, attached thermometer, 71062	−0·1
Barograph thermometer (no number)	−1·9

The rain-gauge clock was cleaned, and a slight adjustment made in the pendulum to correct the rate.

Mr. Cullum was asked to revolve the cylinder each morning so as to obtain a zero-line before starting the gauge.

"Squeezes" were taken of the self-recording and check-gauge funnels, and are forwarded herewith.

The anemometer was taken down, and the various parts cleaned, and fresh asbestos lubricant applied to all the bearings, although the lubricant was found in excellent condition on dismounting the instrument. As reported last year, the fans are a good deal corroded, and new ones will be required before long.

The orientation was duly tested, and found satisfactory.

Two old disused subsidiary scales are returned herewith—one for barograph and the other for dry thermograph tube—also the old attached thermometer and its scale, which were removed from the standard barometer in 1887, and replaced by a new thermometer graduated on the glass stem itself.

Armagh, October 16th–17th.—The anemograph here was found to be maintained in excellent order, the bearings of all parts being well oiled and in good condition.

I dismounted the external parts and examined the cup, arms, and fans, but these do not show any marked signs of wear. After cleaning and replenishing the bearings with fresh asbestos lubricant, the orientation was duly examined and found correct.

The clock was taken to pieces and cleaned, and the recording parts were also examined and oiled.

On examining the rain-gauge I found that the clock was in such excellent condition that it did not require any special cleaning.

"Squeezes" of both the self-recording and spare gauges were obtained, and Dr. Dreyer was asked to revolve the cylinder each morning so as to get a zero-line before starting the gauge.

Fleetwood, October 18th–19th.—At this station the anemometer was found working satisfactorily, the bearings of all parts being well oiled from time to time by Mr. Gaulter. The instrument was dismounted and cleaned, and fresh asbestos lubricant applied to all the bearings. The cups and stays were in good order, but several blades in both direction-fans had become loose, these were made quite fast by soldering before setting up again. I noticed that the lignum vitæ bearings, in which the spindle (carrying the direction-fans) runs, have become a good deal worn, and will have to be renewed next year.

The clock having quite recently been taken to pieces by a local watchmaker, in order to attach a new winding-cord, did not require any special attention, but the recording pencils and fittings were cleaned and oiled.

The orientation was tested and checked by compass, and found correct.

Stonyhurst, October 21st–22nd.—The barograph and thermograph were found in good order, and neither the clocks nor the lenses required cleaning. In accordance with instructions, I examined some of the number 1 photographic curves, and found that the intensity of trace varied considerably, and in consequence the number 2 curves were at times very faint. The assistant to the Rev. W. Sidgreaves informed me that a good deal of bother had been experienced during the last two or three months in regulating the lights, owing to alterations taking place at the gas works, but now that these were completed the flow of gas would be more regular, and no doubt the traces in future would be more uniform.

The thermometers were compared at 52° F. by means of Kew standard, 720, and the following corrections determined:—

Dry standard, 619	−0°·2
Wet „ 382	−0·4
Maximum, M.O. 1525	0·0
Minimum, B.T. 501	+0·3
Attached thermometer to the standard barometer, 696	−0·8
Barograph thermometer, 539	−0·4
Grass minimum, 81514	+0·1

The anemometer having quite recently been dismounted and fresh oil applied to all the bearings, did not require special cleaning. I examined the orientation, and the paper containing the result is sent herewith. The rain-gauge was in good order, and "squeezes" of both the self-recording and spare funnels were taken, and the observer was instructed to revolve the cylinder each morning so as to obtain a zero-line before starting the instrument.

During my visit I made a comparison of the recently repaired standard Fortin barometer, No. 696, with the portable or station barometer, 875,

which has been in use at the observatory for several years past for the control observations. A detailed account of the comparison is appended to this report.

(Signed) T. W. BAKER.

NOTE on the COMPARISON of the BAROMETERS at STONYHURST OBSERVATORY and at KEW ; by T. W. BAKER.

In accordance with instructions sent to Dr. Chree, on June 22nd and July 29th last, I was requested to make a careful comparison of the two barometers in use at Stonyhurst, with a view to determining the cause of the differences reported to exist at times between the two instruments. As, however, I had to inspect several stations in England and Ireland before reaching Stonyhurst, both Dr. Chree and myself thought carrying a Fortin standard barometer from Kew too great a risk, especially as I had to bring away the portable barometer from Stonyhurst ; and considered that the best plan would be to compare the two barometers *in situ*, then bring away the portable one, and compare it direct with the Kew standard at the Kew Observatory.

This plan has been carried out, and the results are given in Tables I. and II.

In Table I. is exhibited a series of 15 readings, observed on October 21st and 22nd, with the Stonyhurst standard, No. 696 (recently repaired), and the portable barometer, No. 875, this latter instrument being the property of the Meteorological Council.

The readings taken have been duly corrected by applying the corrections in use at Stonyhurst, namely, + ·007 inch to the standard, No. 696, and + ·014 inch to the portable, No. 875. At the time of my visit very little variation was experienced in the height of the barometer; indeed, the mercury was almost uniformly level throughout, and it will be seen, on referring to the table, that the mean difference, irrespective of sign, between the two instruments amounted to ·0027 inch, or, taking the signs into consideration, it only gives ·001 inch, so that the two barometers at that time were in close agreement.

Table II. gives a comparison of the portable barometer, No. 875, with the Kew standard at the Kew Observatory, between October 29th and November 5th. During this period barometric pressure varied a good deal, and a series of five rising and five falling readings were observed. The large variation of ·016 inch in the mean differences between the two instruments when the mercury is rising and falling is, doubtless, mainly due to the fact that the portable barometer has a somewhat contracted tube. I am, therefore, of opinion that this will in a great degree account for the differences found at Stonyhurst Observatory, and goes to show that a portable barometer with a contracted tube is not a suitable instrument to employ in standardizing the barograph curves.

The mean correction now found here, viz., + ·019 inch, is not widely different from the correction + ·014 inch used at Stonyhurst. In an instrument of this class the mean correction found, it is almost needless to remark, must depend to some extent on the rate at which barometric changes happen to take place during the period of observation.

Kew Observatory,
November 6th, 1895.

TABLE I.

The following OBSERVATIONS were taken at STONYHURST by Messrs. RONCHETTI and BURNS (Assistants at Stonyhurst Observatory) and Mr. BAKER on October 21st and October 22nd, 1895.

Date 1895.	Standard Barometer, No. 636.			Portable Barometer, No. 875.			Difference. Standard minus Portable.	Observer.
	Reading.	Temp.	Reading corrected for Index Error.	Reading.	Temp.	Reading corrected for Index Error.		
Oct. 21, 12.40	29·673	65°·4	29·680	29·664	66·0	29·678	+·002	T. W. B.
„ 12.42	·673	65·5	·680	·668	65·6	·682	−·002	J. Burns.
„ 12.48	·670	65·0	·677	·660	65·7	·674	+·003	J. Ronchetti.
„ 1.10	·660	66·0	·667	·657	66·0	·671	−·004	T. W. B.
„ 1.20	·660	66·0	·667	·652	66·0	·666	+·001	T. W. B.
„ 1.30	·658	66·0	·665	·650	66·3	·664	+·001	T. W. B.
„ 3.0	·652	65·0	·659	·645	65·6	·659	·000	J. Burns.
„ 3.2	·649	65·2	·656	·644	65·7	·658	−·002	T. W. B.
„ 3.20	·643	65·8	·650	·642	66·0	·656	−·006	T. W. B.
„ 4.54	·648	65·3	·655	·636	66·2	·650	+·005	J. Ronchetti.
„ 4.56	·644	65·5	·651	·638	66·2	·652	−·001	J. Burns.
„ 4.58	·642	66·1	·649	·639	66·3	·653	−·004	T. W. B.
Oct. 22, 10.0 a.m.	·594	64·6	·601	·592	65·4	·606	−·005	J. Burns.
	·592	65·3	·599	·586	66·0	·600	−·001	T. W. B.
	29·592	65·8	29·599	29·588	66·2	29·602	−·003	J. Ronchetti.
Means -	- -	65·5	- -	- -	65·9			
Correction to ther.	- -	−0·8	- -	- -	−1·3	- -	−·061	
Mean Temp.-	- -	64·7	- -	- -	64·6	- -	·0027	irrespective of sign.

The correction to barometer 696, as supplied by the Meteorological Office = + ·007.
The correction to barometer 875, as supplied by the Meteorological Office = + ·014.

Table II.

Comparison of the Portable or Station Barometer, No. 875, with the Kew Standard Barometer, at Kew Observatory. The Readings were taken by Mr. J. Foster and Mr. Baker.

Date.	Mercury +rising −falling.	Kew Standard.			Portable Barometer, 875.		
		Reading.	Temp.	Reading corrected for Index Error.	Reading.	Temp.	Difference.
October 29	+	29·862	49°·7	29·868	29·842	51°·9	−·026
	+	·919	54·8	·925	·898	56·7	−·027
	+	29·934	55·1	29·940	29·910	57·4	−·030
„ 30	−	30·128	54·5	30·134	30·124	56·6	−·010
„ 31	+	·029	56·7	·026	29·996	58·5	−·031
November 2	−	·274	55·1	·280	30·270	55·6	−·010
	−	·254	56·3	·260	·248	56·7	−·013
	−	30·236	57·4	30·242	30·232	57·5	−·010
„ 4	−	29·787	52·6	29·793	29·780	53·6	−·013
„ 5	+	·583	57·7	·594	·573	59·0	−·021
		Mean Temp.	55·0		Correction to ther.	56·4 −1·3	+·019 correction.
						55·1	

Index correction to Kew Standard - - - - + ·006 inch.
Mean correction to Portable Barometer, No. 875, mercury rising = +·027 „
„ „ „ „ „ falling = +·011 „

APPENDIX VI.

Method of Dealing with Telegraphic Weather Intelligence.

The operations connected with the preparation and issue of the Forecasts and Storm Warnings have not undergone any material change. Full details will be found in Appendix X. to the Report for 1891.

Daily Weather Report.

The Office receives, when the telegraphic communications are perfect, sixty reports each morning, eighteen each afternoon (except on Sundays), and twenty-nine each evening, the arrangement of which is explained in the Annual Reports for recent years.

The change made in the Daily Weather Report during 1894, by the insertion of Reports from the Azores (forwarded by the courtesy of the Portuguese Meteorological Authorities), is still in force. The Report fills four large quarto pages, as it has for several years past.

The standing portions (maps, &c.) are printed in blue, and the information for each day is in black.

The Monthly "Correction and Addition List" is published as before.

The subscription for the Report is—

For delivery by hand, where feasible, £2 *per annum;*
„ *by book post* £1 „

An early issue of MS. copies of the observations and remarks is supplied to some applicants at the rate of 2*l.* 10*s.* per annum, and the supply can be extended. Arrangements can also be made for the supply of charts drawn from the 8h. a.m. or 6h. p.m. observations, such as appear in the "Times."

Weekly Weather Report.

The Weekly Weather Report, which has appeared since February 1878, and was re-arranged at the commencement of 1890, is prepared for the calendar week, Sunday to Saturday. It is published regularly on Thursdays and is illustrated by three maps for each day. These, like the Daily Reports, show the outline of the land and sea in blue, but the information in black. The maps show (1) for 8 a.m., the temperature, weather, and sea disturbance: and (2) for 8 a.m. and 6 p.m., the distribution of pressure and the winds, over, and on the coasts of, Europe. The information on the first and second pages of each report consists of observations of Temperature and Rainfall made at 77 stations, the individual values for which are given on the second page of the Report, and of Sunshine records taken at 50 stations.

Tables of *Accumulated Temperature*, designed to give persons engaged in agriculture better means of estimating the manner in which vegetation is affected by temperature than that afforded by the more usual methods of treating the readings of the thermometer, are still published on the first and second pages, and show for each week, and for the whole period from the beginning of the year, the weekly and progressive values respectively, of the combined amount and duration of the excess or defect of the air temperature, above or below a suitably fixed standard, or *base temperature.* The base value adopted is 42° Fahr.

Accumulated Temperature is expressed in *Day-degrees;* a Day-degree signifying 1° F. of excess or defect of temperature above or below the base (42° F.) continued for 24 hours, or any other number of degrees for an inversely proportional number of hours.

The following are the rules for computing, for a weekly period, from the observed maxima and minima, the accumulated temperature above or below 42° F.:—

1. Obtain the mean temperature, from the means of the seven observed maxima and minima, suitably corrected for non-periodic changes of temperature.

2. In obtaining the accumulated temperature four cases may occur, to which the following rules will apply:—

Conditions of Temperature.	To obtain the daily Accumulated Temperature	
	Above 42° F.	Below 42° F.
If the minimum is *above* 42° F. or *equal* to 42° F.	Subtract 42° F. from the mean.	There is none.
If the minimum is *below* 42° F., but the mean for the day is *above* 42° F.	From the difference between the mean for the day and the minimum deduct the accumulated temperature below 42° F., calculated as stated in the next column.	The required quantity is the excess of 42° F. over the minimum, multiplied by the coefficient 0·4.
If the mean for the day is *below* 42° F., but the maximum is *above* 42° F.	The required quantity is the excess of the maximum over 42° F., multiplied by the coefficient 0·4.	From the difference between the mean for the day and the minimum deduct the accumulated temperature above 42° F., calculated as stated in the preceding column.
If the maximum is *below* 42° F., or *equal* to 42° F.	There is none.	Subtract the mean from 42° F.

In each of the above cases the result will be the *average daily* value, and must be multiplied by 7 in order to obtain the value for the whole week.

The coefficient varies with the duration of the period, and also with the base temperature.

The coefficient given above, in Rules 2 and 3, is for a weekly period, and for the base temperature 42° F. The following are its values for other base temperatures,—for 32° F., 0·4; for 52° F., 0·33; for 62° F., 0·25.

A full explanation of the principles on which these rules are based will be found in Appendix II. to the Quarterly Weather Report for 1878.

In addition to the reports from the Telegraphic Reporting Stations, and the returns from certain self-recording Observatories, weekly schedules from 56 volunteer observers are used, the names of the stations and observers being given in Appendix XI., p. 84.

An early copy of the MS. of the report is prepared on Tuesday in every week, and the summary on its first page is sent to several papers on that evening; the printed copies of the complete report are ready for sale on Thursday afternoon.

Appendices, &c. to the Weekly Weather Reports.

Two Appendices, I. and II., have appeared, similar to those for recent years, and the Monthly Summary Supplement gives the average values for Pressure, Temperature, Rainfall, and Bright Sunshine

of the current month, and the difference between these values and the means for the corresponding months in a long series of years, together with the number of days on which rain, snow, hail, thunder &c., &c. occurred, and the number of days on which the wind blew from the eight principal points of the compass.

Issue of Forecasts.

Remarks on the actual state of the weather, and Forecasts *for not more than one day in advance*, are prepared at the Meteorological Office as under:—

*On Week Days.**

(1.) At 11 a.m. (from the morning reports), for the 24 hours ending at Noon on the day following the date of issue. These are intended especially for the early editions of the evening papers, for the clubs, and for exhibition at certain selected stations (see page 12).

(2.) At 3.30 p.m. (from the morning and afternoon reports), for the day following that of issue. This set of forecasts is supplied to a few newspapers and a copy is exhibited regularly at the door of the Meteorological Office. During the Hay Harvest these forecasts are telegraphed to about 28 well-known agriculturists, to be made known in their neighbourhoods (see p. 13).

(3.) At 8.30 p.m. (from the 8 a.m., 2 p.m., and 6 p.m. reports), for the civil day following that of issue. These are supplied gratis to any newspaper or news agency which may apply for them, and send for them regularly. A very large number of the more important papers and news agencies avail themselves of this advantage.

The forecasts are made for the following districts:—

0. Scotland, North.
1. Scotland, East.
2. England, N.E.
3. England, East.
4. Midland Counties.
5. England, South (and English Channel).
6. Scotland, West (with Isle of Man).
7. England, N.W. (with North Wales).
8. England, S.W. (with South Wales).
9. Ireland, North.
10. Ireland, South.

The remarks and forecasts are posted at the doors of the Meteorological Office, 63, Victoria Street, S.W., on week days,* for the inspection of the public. Copies, or extracts from them, are communicated under the conditions stated below, but no information which is not substantially included in them can be supplied.

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* Good Friday, Christmas Day, and Bank Holidays are reckoned as Sundays.

A series of boards is exhibited on the front of the Office showing in large type the state of the wind, weather, and sea disturbance at six stations, situated on our S.E., S., and W. coasts. The stations selected are Yarmouth, Dungeness, The Needles, Scilly, Holyhead, and Valencia (Ireland), and the observations posted up are those for 8 a.m. and 2 p.m. daily, except on Sundays,* the boards being changed at about 9h. 45m. a.m. and 3h. p.m. The information can be easily read from the street.

FORECASTS FOR SUBSCRIBERS.—Any person can be supplied with a copy of the 11 a.m. Forecasts, once on each week day,* on payment of a subscription of ten shillings per annum, or 2*s.* 6*d.* per official quarter, or any part thereof, *in addition to the cost of transmission*; the charges will therefore be, by *letter* post, 9*s.*, by *book* post, 5*s.* 9*d.*, per quarter.

The forecasts for any one of the districts and for any of the hours mentioned above can be forwarded by telegraph daily, on payment of 3*d.* per day for any definite period, in addition to the cost of telegraphy.

FORECASTS FOR CLUBS.—These are drawn up at 11 a.m., for all the districts, and are supplied to Clubs, for a subscription of ten shillings per annum. They are delivered by hand to Clubs situated in or near Pall Mall. Special arrangements can be made for delivery at a greater distance by hand or by post.

FORECASTS FOR HAY AND CORN HARVESTS, OR FOR PUBLIC USE.—Special facilities are offered for the transmission of Forecasts for these purposes, a nominal fee of 2*s.* 6*d.* being charged for an official quarter or any part thereof, in addition to the cost of the telegrams.

EXHIBITION OF TELEGRAPHIC FORECASTS AT LOCAL POST OFFICES.—The Post Office has sanctioned the exhibition of Forecasts at Local Post Offices, provided space is available, if the persons to whom they are addressed desire them to be so exhibited instead of being delivered to themselves.

Unless otherwise arranged, all forecasts transmitted by post are sent by book post, not as letters.

INQUIRIES as to the WEATHER.

INQUIRIES PERSONALLY OR BY MESSENGER.—Any person applying at the Meteorological Office between 11 a.m. and 8 p.m. on week days, and between 7 p.m. and 8 p.m. on Sundays,* can be supplied, in writing, with the latest information in the possession of the Office, with regard to the weather in any district, and with the latest forecast issued for any specified district, on payment of one shilling for each inquiry.

INQUIRIES BY LETTER.—Application may be made by letter, enclosing thirteen pence in stamps if the reply is to be *by post*, and one shilling in stamps, *in addition to the cost of the reply* (consisting of ten words, exclusive of the address) if the reply is to be *by telegraph*.

INQUIRIES BY TELEGRAPH.—Any person may obtain *by telegraph* from the Metcorological Office the latest information as to the weather in any district of the United Kingdom by payment of a fee of one shilling *in addition to the cost of a telegram and reply to any post office*. The telegram containing the inquiry must be addressed as follows:

To

WEATHER,

LONDON.

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* Good Friday, Christmas Day, and Bank Holidays are reckoned as Sundays.

The payment for the reply should be for at least ten words in addition to the address.

Application may also be made for similar information to be sent either *by telegraph* or *post* on some future specified day.

Checking of Forecasts and Storm Warnings.

The forecasts and storm warnings issued by the Office are carefully checked by being compared with the conditions actually experienced during the time to which they refer. The method adopted was fully explained in the Annual Report for 1891, and the results for 1895 will be found on pp. 12 and 15.

In order to render the information in the possession of the Office as to the weather experienced on our coasts still more complete, the Council have, as in preceding years, obtained from the various Lighthouse Boards the original log-books from some of the most exposed light-ships and lighthouses. They again express their cordial thanks for the co-operation so readily granted to them by these Boards.

APPENDIX VII.

Report on the Comparison of the Forecasts issued at 8h. 30m. p.m. with the Weather subsequently experienced, for the 12 Months, April 1895 to March 1896. The results are for the United Kingdom as a whole.

The letters used have the following signification:—

a = complete success. | **c** = partial failure.
b = partial (more than half) success. | **d** = total failure.

The checking has been conducted on the same system as that employed in previous years, *i.e.*, each forecast has been considered under the separate headings of "Wind" and "Weather," but the results of the 8.30 p.m. Forecasts only are here published.

The first column gives the per-centage of success in "Wind," the second in "Weather," and the third the average of the other two.

The Summary for the various districts is given at page 12.

Months.		Per-centages. Wind.	Weather.	Average.	a + b.
April	a	52	60	56	81
	b	22	28	25	
	c	17	8	13	
	d	9	4	6	
May	a	67	62	65	82
	b	15	19	17	
	c	13	13	13	
	d	5	6	5	
June	a	61	69	65	84
	b	18	20	19	
	c	18	6	12	
	d	3	5	4	
July	a	47	60	53	79
	b	23	29	26	
	c	15	7	11	
	d	15	4	10	
August	a	49	59	54	81
	b	30	23	27	
	c	15	13	14	
	d	6	5	5	
September	a	59	68	64	84
	b	19	21	20	
	c	15	7	11	
	d	7	4	5	
October	a	40	54	47	74
	b	31	23	27	
	c	22	15	19	
	d	7	8	7	
November	a	45	59	52	80
	b	27	29	28	
	c	22	8	15	
	d	6	4	5	
December	a	52	57	55	80
	b	24	26	25	
	c	18	8	13	
	d	6	9	7	
January	a	51	57	54	83
	b	27	30	29	
	c	14	7	10	
	d	8	6	7	
February	a	47	57	52	80
	b	28	28	28	
	c	15	7	11	
	d	10	8	9	
March	a	29	48	39	74
	b	35	35	35	
	c	27	11	19	
	d	9	6	7	
The entire year	a	50	59	55	80
	b	25	26	25	
	c	18	9	14	
	d	7	6	6	

APPENDIX VIII.

Storm Signal Stations.

The Meteorological Office issues notices of atmospherical disturbances on or near the coasts of the British Islands (free of charge) to ports and fishing stations recommended by responsible local authorities.

The fact that one of these notices has been received at any station is made known by hoisting a black canvas cone, 3 feet high and 3 feet wide at base, which has the appearance of a triangle when hoisted. The telegram directing the cone to be hoisted should be exhibited near the signal staff.

At dusk, whenever a signal ought to be flying if it were daylight, a night signal, consisting of three lanterns hung on a triangular frame, may be hoisted in place of the cone.

The Meteorological Office supplies the canvas cone, but does not undertake to supply the lanterns. In all cases the local authorities must undertake the charges incidental to the hoisting of the signal, such as flagstaff and gear, oil, &c., and also as to the keeping of the apparatus in repair, painting, &c.

The following is a list of the stations at which the signals are hoisted :—

NORTHERN.	WESTERN.	SOUTHERN.	EASTERN.
Scotland, N.E.	Ireland, S.W.	England, S.W.	England, N.E.
Lerwick.	Tuskar L.H.	Scilly.	Berwick - on Tweed.
Fair Isle L.H.	New Ross.	St. Sennen.	Cullercoats.
Scalloway.	Dunmore East.	Newlyn, West.	Tynemouth.
Dunrossness.	Dungarvan.	Penzance.	South Shields.
Stromness.	Minehead L.H.	The Lizard.	Souter Point L.H.
Kirkwall.	Youghal.	Falmouth.	Sunderland.
Cantick Head L.H.	Queenstown.	Pendennis.	Hartlepool.
Holborn Head.	Cork.	Mevagissey.	Middlesborough.
Dunnet Head.	Passage.	Plymouth.	Redcar.
Wick.	Kinsale.	Devonport.	Flamborough Hd.
Tarbet Ness L.H.	Do. (Old Head).	Prawle Point.	Whitby.
Avoch.	Galley Head L.H.	Teignmouth.	Filey.
Inverness.	Castletownshend.	Exmouth.	Bridlington.
Nairn.	Brow Head.		Hull.
Burghead.	Tralee.		Goole.
Lossiemouth.	Limerick.		Grimsby.
Buckie.	Loophead L.H.		Boston.
Port Knockie.	Galway.		
Cullen.			
Portsoy.	Ireland, N.W.		
Banff.	Tory Island L.H.		
Fraserburgh.	Rathmullan.		
Peterhead.	Malin Head.		
Aberdeen.	Portrush.		
Girdleness L.H.	Port Ballintrae.		

[*Continued*

NORTHERN.	WESTERN.	SOUTHERN.	EASTERN.
SCOTLAND, E.	IRISH SEA.	ENGLAND, S.	ENGLAND, E.
Stonehaven.	Belfast.	Guernsey.	Sutton Bridge.
Montrose.	Donaghadee.	St. Helier's (Jersey).	Lynn.
Scurdy Ness L.H.	Howth.	Gorey „	Sheringham.
Broughty Ferry.	Kingstown.	Weymouth.	Cromer.
Dundee.	Pt. of Ayre (I. of M.)	Anvil Point L.H.	Yarmouth.
St. Andrews.	Ramsey „	Poole.	Southwold.
Anstruther.	Douglas „	Southampton.	Orford Ness L.H.
Pittenweem.	Castletown „	Hamble.	Ipswich.
Buckhaven.	Silloth.	Yarmouth.	Harwich.
Wemyss, West.	Maryport.	Cowes.	Gunfleet L.V.
Burntisland.	Workington.	Ryde.	
Grangemouth.	Whitehaven.	St. Catherine's Pt.	
Bo'ness.	Barrow.	Portsmouth.	
Granton.	Morecambe.	Littlehampton.	
Newhaven.	Fleetwood.	Brighton.	
Leith.	Blackpool.	Newhaven.	
Fisherrow.	Lytham.		
Dunbar.	Southport.		
Cockburnspath.	Liverpool.		
St. Abb's Head.	Runcorn.		
Eyemouth.	Connah's Quay.	ENGLAND, S.E.	
	Penmaenmawr.	Eastbourne.	
	Port Penrhyn.	Hastings.	
	Port Dinorwic.	Rye.	
	Caernarvon.	Sandgate.	
	South Stack L.H.	Folkestone.	
	Holyhead.	Dover.	
	Point Lynas L.H.	Ramsgate.	
	ST. GEORGE'S CHANNEL.	North Foreland.	
SCOTLAND, N.W.		Margate.	
	Aberystwyth.	Faversham.	
Portnaguran.	Milford.	Sheerness.	
Stornoway.		Chatham.	
Port of Ness.	BRISTOL CHANNEL.		
Stourhead L.H.			
C. Wrath L.H.	Pembrey.		
	Llanelly.		
	Swansea.		
	Briton Ferry		
	Porthcawl.		
	Nash L.H.		
	Penarth.		
SCOTLAND, W.	Cardiff.		
Glasgow.	Do. (Bute Dock).		
Greenock.	Do. (Barry Dock).		
Rothesay.	Newport.		
Campbelton.	Weston-super-Mare.		
Mull of Cantire L.H.	Burnham.		
	Bridgewater.		
Girvan.	Lundy Island.		
Ballantrae.	Ilfracombe.		
Corsewall Point L.H.	Bull Point L.H.		
	Barnstaple.		
Mull of Galloway L.H.	Appledore.		
	Hartland Pt. L.H.		
	Boscastle.		
	Port Isaac.		
	Newquay.		
	Hayle.		
	St. Ives.		

APPENDIX IX.

Fishery Barometers.

List of Places supplied with Fishery Barometers.

Shetland Isles.—Balta Sound, Uya Sound, Burravoe, Nesting, Lerwick, Sandwick, Scalloway, Symbister.

Orkney Isles.—Westray, Papa Westray, Burray, Kirkwall.

Scotland, east coast.—Duncansbay, Freswick, Auchengill, Keiss, Ackergill, Staxigoe, Wick, Lybster, Dunbeath, Inver, Portmahomack, Ballintore, Cromarty, Avoch, Nairn, Burghead, Portessie, Port Knockie, Portsoy, Whitehills, Gardenstown, Rosehearty, Pitullie, Fraserburgh, Inverallochy, Pointlaw, Findon, Portlethen, Skateraw, Stonehaven, Arbroath, Broughty Ferry, St. Andrews, Crail, Cellardyke, St. Monance, Burntisland, Newhaven.

England, east coast.—Berwick, North Shields, South Shields, Sunderland, West Hartlepool, Staithes, Scarborough, Filey, Flamborough, Bridlington Quay, Withernsea, Hull, Lynn (2), Wells, Gorleston, Lowestoft, Orford Haven, Felixstowe, Harwich, Brightlingsea, West Mersea, Maldon, Leigh, Margate, Deal, Kingsdown, Dover.

England, south coast.—Bognor, Ryde, Bembridge, Brixton, Atherfield, Ventnor, Yarmouth (Isle of Wight), Gorey (Jersey), Haslar Hospital, Poole, Weymouth, Portland, Budleigh Salterton, Exmouth, Cawsand, Mevagissey, Gorranhaven, Devoran, Portscatho, Penryn, Durgan, Porthallow, Falmouth, Coverack, Newlyn (2), Mousehole.

England, south-west coast.—St. Ives, Hayle, Port Isaac, Boscastle, Bideford, Burnham, Highbridge, Weston-super-Mare.

Wales.—Briton Ferry, Swansea, Angle, Milford, Aberystwyth, Nevin, Carnarvon.

England, north-west coast.—Fleetwood, Morecambe, Maryport.

Isle of Man.—Douglas, Port St. Mary, Peel (2).

Scotland, south-west coast.—Port Patrick, Stranraer.

Ireland, east coast.—Cushendall, Belfast, Bangor, Groomsport, Donaghadee, Ardglass, Warren Point, Carlingford, Greenore, Dundalk, Malahide, Howth, Kingstown (2), Bray, Wicklow.

Ireland, south coast.—Dunmore East, Dungarvan, Crosshaven, Kinsale, Union Hall, Castletownsend, Baltimore, Schull (2), Crookhaven, Castletown (Berehaven), Lawrence Cove, Ballydonegan, Ballycrovane.

Ireland, west coast.—Valencia, Dingle, Tralee, Ballyheigue, Tarbert, Kilcredane, Kilronan, Galway, Spiddal, Cleggan, Elly Bay, Ballyglass, Ballycastle (Co. Mayo), Donegal, Tribane, Killybegs, Teelin, Malinmore, Portnoo, Burton Port, Kincaslagh, Bunbeg.

Ireland, north coast.—Dunfanaghy, Rathmullen, Buncrana, Malin Head, Moville, Greencastle, Portstewart, Portrush, Port Ballintrae, Ballycastle (Co. Antrim).

Scotland, west coast.—Tarbert (Loch Fyne), Loch Ranza, Campbeltown, Carradale, Portree, Armadale (Isle of Skye), Isle of Soay, Plockton, Shieldaig, Gruinard, Ullapool, East Mey, Gills, Stroma(2).

Hebrides.—Stornoway, Portnaguran, Obb, Valtos, Carloway, Ness.

APPENDIX X.

Methods followed in dealing with Meteorological Returns from Land Stations in the British Isles.

These stations are of seven classes, as stated on page 17.

I.—*Observatories continuously observing all the Meteorological Elements.*

Returns from observatories.

Hourly measurements of the curves obtained from the self-recording instruments at the observatories of the Office are made by the observers at each station, on printed forms supplied for the purpose, which, together with the curves, are forwarded to the Office weekly. They comprise measurements of the barograms, of the dry-bulb and wet-bulb thermograms, of the anemograms, and of the rain-gauge curves.

Examination of returns.

The measurements are subjected to a careful examination in order to ensure as far as possible their accuracy, and the revised regulations which have been adopted to secure this end will be found in the Report of the Office for 1890. They comprise rules for the guidance of observers, as well as of the assistants charged with the examination of the work at the Office. Attention need be called here to only two of these rules, viz., (*a*) the use of subsidiary sheets on which are entered the results of a second set of measurements of the curves made after, and quite independently of, the first set, and with a different form of scale, the two sets of measurements being afterwards compared together, and any differences found inquired into and set right; and (*b*) the re-measurements of the curve made by the assistants at the Meteorological Office, and which always amount to 40, and in doubtful cases to many more, per month, for each element.

Results of examination and report to Council.

The attention of the observers is always drawn to such errors as may be detected, and to any failures in the continuity of the curves arising from failure of the light, stoppage of the clock, defective photography, faulty action of the wet-bulb thermometer, &c.; a report containing the results of the examination of each observatory being also submitted to the Council periodically. The curves and tabulations are eventually bound and stored in the Office.

General supervision of observatory work.

In connexion with this work should be mentioned the general watch which has to be kept over the working of the observatories and of the instruments, not only to secure uniformity amongst them and observance of rules, but also to guard against small changes which are liable to occur at certain times, especially with the thermographs, and which may affect the scale-values of the instrument or the datum lines used for the tabulation of the curves. About twice a year this work calls for special examination, entailing some considerable time and occasionally the engraving of new scales for measuring the curves.

Method of dealing with the Numerical Results from the Self-recording Observatories.

Interpolations.

In dealing with the tabulations the first step is to go over the sheets and fill up by interpolation, wherever possible, any gaps or breaks in the continuity of the record.

The records having been made as complete as possible, are then used for the calculation of daily and hourly mean values, for periods of five days, calendar months, and for the year; which, together with other data obtained from the same source, are published under the title of "Hourly Means of the Readings obtained from the Self-recording "Instruments at the Five Observatories under the Meteorological "Council." The volume for 1893 is almost ready for issue, and that for the year 1894 is also in the press. See p. 19.

II.—*Anemographic Stations at which the Wind is recorded continuously.*

The anemograms received from Alnwick Castle, Deerness, Dublin, Fleetwood, Holyhead, North Shields, Scilly, and Yarmouth are regularly examined and tabulated in the Office, and the sheets bound up in volumes. Besides special inquiries on legal and other points that from time to time arise, and in which these documents are of high importance, the tabulations are always employed in the preparation of the various Reports issued by the Office. They are also regularly used in the checking of the Storm Warnings.

III.—*Barograph Stations at which the Atmospheric Pressure is continuously recorded.*

These stations are for the most part either telegraphic reporting stations or stations of the second order. The instrument in most general use is Richard's self-recording aneroid. At the telegraphic stations the record is first used to inform the observers as to the changes which have occurred since the last observing hour, and these changes, when large, are reported by wire to London, and are used in preparing the forecasts. The curves themselves are forwarded to the Office weekly and are stored for future use.

IV.—*Sunshine Stations at which the duration of Bright Sunshine is continuously recorded.*

Sunshine records.

The daily records of sunshine which are now received from 48 Stations in the British Islands are examined generally, to guard against accidental changes in the adjustment of the instruments. Notes explaining any omission or accidental defect are added to the cards, if required, and after their receipt has been acknowledged, they are duly stamped and dated and then stored in the Office.

Weekly totals.

A tabulation of these curves is published as part of the Weekly Weather Report, mentioned in Appendix VI., and for those stations which are also Stations of the Second Order the monthly totals of bright sunshine in hours, together with the per-centages of its possible duration, are published as Part IV. of "Returns from Stations of the Second Order." Hourly tabulations are made of the returns from the observatories, and the mean hourly amounts are published in the volumes of "Hourly Means." A table showing the daily amount of sunshine at Bunhill Row, one of the London stations, is also prepared quarterly, for the Royal Meteorological Society.

V.—*Telegraphic Reporting Stations.*

These are 30 in number, and the particulars as to the observations taken at them, and the methods adopted in dealing with them, will be found fully detailed in Appendix VII. to the Report for 1888–89, and in Appendix VI. to the present volume.

VI.—*Land Stations.*

Origin and progress of system.

Ever since the year 1866 returns of more or less completeness have been received from land stations in the United Kingdom. In that year there was only one station, but by 1871 the number had increased to 15, and five years later to 49, including 14 stations belonging to the Royal Meteorological Society, copies of the returns from which were sent to the Office under a special arrangement with the Society.

At the end of March 1896 the total number of stations was 132, including 14 belonging to the Royal Meteorological Society and 17 belonging to the Scottish Meteorolcgical Society.

The Stations of the Second Order are distributed as follows: 37 in England, 2 in Wales, 22 in Scotland, and 12 in Ireland.

The methods followed with regard to the examination and publishing of these returns have been fully detailed in previous reports, and need not now be repeated. The changes introduced into the volume for 1886 have been continued in those for later years. These refer to the barometer readings, which are now given at station-level instead of being reduced to the mean sea-level; and to the humidity, where the depression of wet-bulb is shown, the international forms A and B being modified accordingly.

The volume for 1892 contains returns from 70 stations.

Arrangements have been made under which it is hoped that the arrears of this publication will be rapidly reduced.

Reports from the Irish stations are regularly supplied to the Registrar-General for Ireland for his Weekly and Quarterly Returns.

When an application for the adoption of a new station is received, a schedule is forwarded to the observer containing a series of questions as to the outfit of the station, the exposure of the instruments, and the influence likely to be exerted on their indications by surrounding objects, such as houses and trees. Only mercurial barometers are accepted, and only such as have been duly verified. All thermometers must have been tested at Kew. A plan of the station, showing the positions of the instruments with regard to neighbouring objects, is also required. New stations.

On the return of this schedule the answers are considered, and, where necessary, alterations are advised.

If, however, the existing arrangements are satisfactory, tables for reducing the barometer readings to 32° Fahrenheit at mean sea-level are prepared and duplicates sent to the observer, together with a set of Hygrometrical Tables, and a copy of "Instructions in the Use of Meteorological Instruments."

The first returns are compared and examined with special care, and a report of the result of the examination is forwarded to the observer, with instructions how best to improve and complete the returns.

There are still many parts of the British Islands very poorly represented by the existing stations; for instance, Wales, the northern coasts of Cornwall and Devon, Somersetshire, Essex, the south-east of Ireland, &c., and any information for these districts would be valuable.

VII.—*Land Stations of the Third Order.*

These are 59 in number. The information supplied from them is, in some cases, similar to that supplied by a station of the second order, but taken only once daily, or at irregular hours, or perhaps less complete. At other stations less detail is given; for instance, 29 stations furnish only the daily rainfall. All the information thus afforded is utilised in some way or other, though it is not all included in the Office publications. The rainfall values are copied and supplied to Mr. Symons, F.R.S., for publication in "British Rainfall."

Inspection.

The Stations of the Second Order are regularly inspected, the attention of the inspector being directed by the Office to any special point which may require investigation.

List of Stations.

In Appendix XI., page 84, is given a complete list of the stations supplying information to the Office.

APPENDIX XI.

List of Stations in the British Islands from which Information has been received at the Meteorological Office during the year ending March 31st, 1896.

The Stations marked "S" are in connexion with the Scottish Meteorological Society, and those marked "M" are in connexion with the Royal Meteorological Society. The returns from these Stations are received by the Office under an arrangement which will be found detailed in previous reports.

In certain cases where the actual station at which the Observations have been taken is not generally known, and could not be readily identified, the name of some village or town near has been inserted following the name of the station, within brackets.

The nature of the information received from each station is indicated by letters as follows :—

A. *Observatories.*—Continuous record of pressure, temperature, wind, sunshine and rain, with eye observations of the amount, form, and motion of the clouds, and notes on the weather.

B. *Anemograph Stations.*—Continuous record of the direction and velocity (or force) of the wind.

C. *Barograph Stations.*—Continuous record of pressure.

D. *Second Order Stations.*—Regular observations at 9 a.m. and 9 p.m. each day, local time, of pressure, temperature (dry-bulb and wet-bulb), wind, cloud, and weather, with the daily maxima and minima of temperature, the daily rainfall, and general remarks on the weather.

E. *Second Order Stations.*—Monthly means and summaries on Form B. of observations taken at 9 a.m. and 9 p.m., each day as above.

F. *Climatological Stations.*—The maximum and minimum temperature and the rainfall for each day, with remarks on the weather. This information is sent to the Meteorological Office each week for use in the "Weekly Weather Report."

G. *Third Order Stations.*—Observations of the same kind as at Second Order Stations, but either :—

(*a*) less full.
(*b*) taken only once daily.
(*c*) taken at irregular hours.

R. *Rainfall Stations.*—Daily observations of the amount of rainfall, with remarks on the weather.

S. *Sunshine Stations.*—Continuous record of bright sunshine.

T. *Telegraphic Stations.*—Regular observations at 8 a m. and 6 p.m. G.M.T. (and from some stations at 2 p.m. in addition), of pressure, temperature, wind and weather, with the daily maxima and minima of temperature, the daily rainfall, and, where possible, the sea-disturbance at 8 a m. each day and the daily amount of bright sunshine. This information is sent to the Meteorological Office each day by telegraph, for use in the "Daily Weather Report" and, as required, for use in the "Weekly Weather Report."

W. *Sea-temperature.*—Daily observations of the temperature of the sea water.

Station.	Lat.	Long.	Height in feet above M.S.L.	Observer.	Nature of Information supplied.
Aberdeen Observatory -	57° 10′ N.	2° 6′ W.	46	Prof. C. Niven -	A. T. C.
" Cove Bay -	57 9 "	2 5 "	—	Coastguard - -	W.
Alnwick Castle - -	55 25 "	1 43 "	210	Humphry Willyams, for the Duke of Northumberland.	B. F.
Ardrossan, Ayrshire -	55 38 "	4 50 "	15	J. W. Mayes -	T.
Arley Cottage (Mount Nugent).	53 50 "	7 18 "	262	Maj. Somerset H. Maxwell.	D. S.
Arlington Court, Barnstaple.	51 8 "	3 58 "	613	W. Stewart, for Lady Chichester.	F.
Armagh Observatory -	54 21 "	6 39 "	196	J. L. E. Dreyer -	B.D.F.S.
Arran, North, Galway -	53 6 "	9 40 "	—	Coastguard - -	G. W.
Aysgarth Vicarage, Yorks -	54 18 "	1 58 "	646	Rev. F. W. Stow -	D.
Bahama Bank Lightship	54 20 "	4 13 "	—	Light-keepers -	W.
Ballantrae, Ayrshire -	55 6 "	5 0 "	—	Coastguard - -	W.
Ballydonegan, Co. Cork -	51 38 "	10 3 "	—	" -	W.
Ballyglass, Co. Mayo -	54 17 "	9 52 "	—	" -	W.
Baltimore, Co. Cork -	51 28 "	9 22 "	—	" -	G.
Bantry - - -	51 41 "	9 27 "	—	R. Brennar -	R.
Belmullet, Co. Mayo -	54 13 "	9 59 "	40	Miss M. J. Tolan -	T.
Belvoir Castle, Grantham -	52 54 "	0 47 "	259	W. H. Divers -	D.
Ben Nevis - - -	56 48 "	5 0 "	4,406	R. T. Omond, for Directors Ben Nevis Observatory.	A.
Bennington, Herts. -	51 54 "	0 5 "	407	Rev. J. D. Parker -	E.
Berkhamsted - -	51 46 "	0 34 "	400	E. Mawley - -	E.
Bidston Observatory, Liverpool.	53 24 "	3 4 "	188	W. E. Plummer -	D. T.
Birr Castle, Parsonstown -	53 6 "	7 55 "	175	O. Boeddicker, for Earl of Rosse.	D. S. T.
Blackpool - - -	53 48 "	3 3 "	31	A. J. Anderson -	F. S.
Blacksod Point, Co. Mayo -	54 6 "	10 4 "	—	Coastguard - -	W.
Bolton, Chadwick Museum	53 35 "	2 27 "	389	W. W. Midgley -	G.
Bournemouth - -	50 43 "	1 53 "	—	Messrs. Primavesi for Town Council.	S.
Braemar - - -	57 0 "	3 24 "	1,111	J. Aitken - -	D. F. S.
Bramley, Surrey - -	51 11 "	0 33 "	148	J. Bartlett - -	D.
Bray, Co. Wicklow - -	53 12 "	6 6 "	—	Coastguard - -	G.
Brighton - - -	50 49 "	0 8 "	—	A. Newsholme -	S.
Bristol - - -	51 28 "	2 35 "	92	J. Harvey Jones -	F.
Broadford (Hurdlestown), Co. Clare.	52 48 "	8 38 "	157	Maj. W. O. Bentley, R.A.	R.
Burnmouth, Ayton, Berwick	55 51 "	2 4 "	—	Coastguard - -	W.
Burntisland - - -	56 4 "	3 14 "	—	" - -	W.
Buxton - - -	53 14 "	1 54 "	987	E. J. Sykes - -	E.
Caernarvon Bay Lightship	53 6 "	4 45 "	—	Light-keepers -	W.
Cambridge - -	52 13 "	0 6 E.	88	Miss A. Walker -	T. S.
Cardigan Bay Lightship -	52 25 "	5 1 W.	—	Light-keepers -	W.
Cargen - - -	55 2 "	3 37 "	72	P. Dudgeon (the late) and A. Peacock.	E.
Carrigallen, Co. Leitrim -	53 58 "	7 38 "	? 350	Mrs. J. Godley -	R.
Castletownshend, Co. Cork	51 32 "	9 11 "	—	Coastguard - -	G.
Chatham - - -	51 23 "	0 32 E.	136	The Instructor in Surveying.	G.
Cheadle - - -	52 58 "	1 57 W.	646	J. C. Philips -	E. F.
Cheltenham - - -	51 54 "	2 3 "	184	R. Tyrer - -	E.
Chester - - -	53 12 "	2 54 "	59	Rev. J. Cairns Mitchell.	D.
Churchill, Oxon - -	51 56 "	1 34 "	? 450	Giles Edmonds -	R.
Churchstoke - -	52 31 "	3 5 "	538	P. Wright - -	D. F. S.
Cirencester - - -	51 43 "	1 57 "	446	Prof. Ohm - -	F. S.
Clegran, Co. Galway -	53 33 "	10 8 "	—	Coastguard - -	W.
Colebrooke Park, Brookeborough, Co. Fermanagh.	54 21 "	7 22 "	271	M. Ferguson, for Sir A. D. Brooke, Bt.	D. F.
Colwyn Bay - - -	53 17 "	3 43 "	—	R. E. Lord - -	S.
Coningbeg Lightship -	52 2 "	6 40 "	—	Light-keepers -	W.
Cooper's Hill, Egham -	51 26 "	0 34 "	279	Prof. H. McLeod -	G.
Cromarty - - -	57 41 "	4 0 "	—	Coastguard - -	W.
Cronkbourne (Douglas), Isle of Man.	54 10 "	4 29 "	137	A. W. Moore -	D. F. S.
Crookhaven - - -	51 28 "	9 43 "	—	Coastguard - -	G.
Crosshaven - - -	51 48 "	8 18 "	—	" - -	G.
Cuckfield, Sussex - -	51 1 "	0 9 "	389	John Howe - -	R.
Cullompton - - -	50 51 "	3 23 "	202	T. Turner - -	F. S.
Currygrane (Edgeworthstown), Co. Longford.	53 45 "	7 39 "	267	J. M. Wilson -	D. F.

	Station.	Lat.	Long.	Height in feet above M.S.L.	Observer.	Nature of Information supplied.
	Daunt's Rock Lightship -	51° 43′ N.	8° 16′ W.	—	Light-keepers -	W.
	Deerness, Orkney Islands -	58 56 „	2 45 „	169	M. Spence - -	B. D. S.
	Donaghadee - - -	54 38 „	5 32 „	26	T. MacGowan -	T.
	Doneraile, Co. Cork -	52 13 „	8 34 „	—	Captain Evans -	R.
	Dover, Waterworks -	51 7 „	1 18 E.	198	H. E. Stilgoe -	R.
	Dublin, Botanic Gardens, Glasnevin.	53 23 „	6 16 W.	67	F. W. Moore -	D.
	„ City - -	53 20 „	6 15 „	47	J. W. Moore -	D. F.
	„ Mountjoy Obs., Phœnix Park.	53 22 „	6 21 „	155	Lt.-Col. Kirkwood, R.E.	B. D. S.
	Duddington - - -	52 36 „	0 32 „	152	Fred Coventry -	R.
S	Dundee - - -	56 28 „	2 56 „	160	J. Carnochan -	D.
	Dunfanaghy (Sheephaven)	55 11 „	7 58 „	—	Coastguard - -	W.
	Dungeness - - -	50 55 „	0 59 E.	26	W. Batton - -	T.
S	Dunrobin Castle - -	57 59 „	3 56 W.	12	D. Melville, for the Duke of Sutherland.	D.
	Durham - - -	54 46 „	1 35 „	336	H. J. Carpenter -	D. F. S.
	Dursley (Farnley), Glos. -	51 41 „	2 21 „	—	R. W. Pinney -	R.
	Eastbourne - - -	50 46 „	0 17 E.	38	R. Sheward - -	D. S.
	East Goodwin Lightship -	51 13 „	1 36 „	—	Light-keepers -	W.
	Edinburgh - - -	55 57 „	3 12 W.	253	R. C. Mossman -	D. S.
	English and Welsh Grounds Lightship.	51 27 „	3 0 „	—	Light-keepers -	W.
	Ennis, Co. Clare - -	52 51 „	8 59 „	18	P. L. K. Dobbin -	R.
	„ „ Roslevan -	52 51 „	8 59 „	40	Mrs. J. W. Scott -	R.
	Epsom, R. Med. College -	51 20 „	0 14 „	294	W. T. N. Spivey -	D.
	Falmouth - - -	50 9 „	5 4 „	167	E. Kitto - -	A. F.
	Fleetwood - - -	53 56 „	3 1 „	—	M. S. Gaulter -	B.
	Forgandenny, Perth -	56 21 „	3 29 „	175	C. L. Wood - -	C.
S	Fort Augustus - -	57 8 „	4 40 „	68	Rev. M. Wall -	E. F. S.
	Fort William - -	56 48 „	5 6 „	32	R. T. Omond, for Directors, Ben Nevis Observatory.	A. F.
	Foynes, Co. Limerick -	52 37 „	9 7 „	108	Lord Monteagle -	F.
	Fredville (Dover) - -	51 7 „	1 18 E.	173	H. W. Plumptre -	R.
	Fulbeck, Lincolnshire -	53 3 „	0 37 W.	? 180	Rev. Vere F. Willson	D.
	Geldeston, Beccles - -	52 28 „	1 31 E.	37	E. T. Dowson -	D. F. S.
	Gilcrux (Maryport) -	54 44 „	3 23 W.	261	J. Monkhouse -	D.
	Glasgow - -	55 53 „	4 18 „	180	Prof. L. Becker -	A. D. F.
S	Glencarron - - -	57 30 „	5 14 „	489	D. D. Munro -	E. F.
S	Glenlee - - -	55 5 „	4 12 „	203	W. Melville - -	E. F.
S	Gordon Castle - -	57 37 „	3 5 „	101	J. Webster (for the Duke of Richmond and Gordon, K.G.).	E.
	Gorleston, Suffolk - -	52 35 „	1 43 E.	—	R. J. C. Day -	G.
	Guernsey (St. Peter's) -	49 32 „	2 32 W.	—	F. E. Carey - -	S.
	Harpenden, Herts. - -	51 49 „	0 20 „	419	T. Wilson - -	G.
	Haslar Hospital, Hants -	50 47 „	1 7 „	—	T. Rogers - -	G.
	Hawes Junction - -	54 19 „	2 18 „	1135	W. H. Bunce -	G.
	Hesley Hall (Bawtry) -	53 28 „	1 2 „	65	B. I. Whitaker -	F.
S	Hereford - - -	52 5 „	2 45 „	274	T. A. Chapman -	F.
	Heysham Hall, Lancashire	54 3 „	2 54 „	95	S. Lomas, for Miss L. Grafton.	D.
S	Hillington - - -	52 48 „	0 33 E.	88	Rev. H. E. B. Ffolkes	D. F. S.
	Holyhead, Harbour Office -	53 18 „	4 39 W.	57	F. M. Cotton - -	B. W.
	„ Sailors' Home -	53 18 „	4 39 „	48	T. Chope - -	T.
	Hurst Castle - -	50 42 „	1 33 „	12	E. T. Tremble - -	T.
	Kearsney Abbey, Dover -	51 8 „	1 17 E.	? 100	C. W. Curtis -	R.
	Ketton, Stamford - -	52 38 „	0 32 W.	—	F. Coventry - -	F. G.
	„ „ The Holmes	52 38 „	0 32 „	—	„ - -	R.
	„ „ Colly Weston	52 37 „	0 31 „	270	Miss A. Tasker -	R.
	Kew Observatory - -	51 28 „	0 19 „	18	C. Chree - -	A.
	Kilcredane, Co. Clare -	52 35 „	9 47 „	—	Coastguard - -	W.
	Kilkenny - -	52 39 „	7 14 „	212	H. Carlton, for the Marquis of Ormonde.	C. F.
S	Killarney - - -	52 4 „	9 30 „	86	Ven. Archdeacon Wynne.	E. F.
	Killeney (Cloneevin), Co. Dublin.	53 16 „	6 7 „	—	R. O'Brien Furlong	R.
	Kirkwall - - -	58 59 „	2 57 „	—	Coastguard - -	W.
	Kish Bank Lightship -	53 19 „	5 55 „	—	Light-keepers -	W.

Station.	Lat.	Long.	Height in feet above M.S.L.	Observer.	Nature of Information supplied.
Ladylaw (Hawick) - -	55° 28′ N.	2° 47′ W.	439	W. R. Wilson -	C. D.
Lamlash, Isle of Arran, Scotland.	55 32 „	5 8 „	—	Coastguard - -	W.
Landale, Argyleshire -	56 41 „	5 41 „	14	A. Fletcher, for T. H. G. Newton.	D. F.
S Lednathie - -	56 45 „	3 7 „	719	W. Morrison (for Stormonth Darling).	E.
Leith - - - -	55 58 „	3 10 „	20	T. Richardson -	T.
Leman and Ower Lightship	53 8 „	2 2 E.	—	Light-keepers - -	W
Lerwick - - -	60 9 „	1 8 W.	—	Coastguard - -	W.
Limerick - - -	52 39 „	8 36 „	—	A. W. Shaw - -	R.
Liscannor, Co. Clare -	52 56 „	9 23 „	—	Coastguard - -	W.
S Lissan, Co. Tyrone - -	54 41 „	6 45 „	305	Sir N. Staples, Bt. -	E.
Llandinam, Montgomery -	52 29 „	3 26 „	496	Edward Davies -	R
Llandovery - - -	51 59 „	3 48 „	217	J. Watkins - -	F.
S Llandudno - -	53 21 „	3 50 „	88	J. Nicol - - -	E. F.
„ - - -	53 21 „	3 51 „	? 20	J. McMaster -	S.
London, Brixton - -	51 29 „	0 7 „	77	F. Gaster - -	T.
„ City - -	51 32 „	0 5 „	80	Messrs. de la Rue -	S.
„ Pall Mall - -	51 32 „	0 8 „	—	Athenæum Club -	C.
„ Stamford Hill -	51 36 „	0 5 „	? 75	Rev. J. S. St. John -	R.
„ Westminster -	51 31 „	0 8 „	76	The Staff of the Met. Office.	B.
„ Westminster Training College.	51 31 „	0 8 „	—	H. A. Reatchlous -	S.
Londonderry - -	55 0 „	7 19 „	67	J. Conroy - -	D. F.
Loughborough - -	52 47 „	1 12 „	169	W. Berridge - -	T.
Lowestoft - -	52 29 „	1 44 E.	—	J. Moore - -	G.
Machrihanish - -	55 25 „	5 44 W.	16	J. Franklin-Adams	G.
Malin Head, Co. Donegal -	55 23 „	7 24 „	230	J. Williams - -	T. C.
Manchester - - -	53 29 „	2 13 „	190	J. Niven - -	G. S.
S Marchmont - - -	55 44 „	2 25 „	498	J. A. Wood - -	E. F. S
S Margate - - -	51 24 „	1 24 E.	83	J. Stokes - -	D. S.
Markree Castle, Co. Sligo -	54 11 „	8 27 W.	122	A. Marth, for Col. Cooper.	D. F. S.
Minard, Co. Kerry - -	52 7 „	10 8 „	—	Coastguard - -	W.
Morpeth - - -	55 11 „	1 40 „	—	Captain H. Terry -	C.
Nairn - - -	57 36 „	3 52 „	84	Miss Penny - -	T.
Newcastle-on-Tyne - -	54 58 „	1 37 „	152	N. H. Martin -	G. S.
Newarp Lightship -	52 45 „	1 53 E.	—	Light-keepers -	W.
Newport, Monmouth -	51 35 „	3 0 W.	—	T. W. Houghton -	R.
Newquay, Cornwall -	50 25 „	5 4 „	? 250	J. Pearce - -	S.
„ „ -	50 25 „	5 5 „	—	Coastguard - -	W.
Northallerton - -	54 20 „	1 26 „	130	W. Stead - -	R.
North Foreland - -	51 23 „	1 27 E.	115	A. Cox - -	T.
North-West Lightship, Liverpool.	53 31 „	3 31 W.	—	Light-keepers - -	W.
S Ochtertyre - - -	56 23 „	3 53 „	329	G. Croucher, for Sir P. K. Murray, Bt.	E. F.
Omagh (Edenfel) - -	54 36 „	7 19 „	300	Col. Buchanan -	F.
Oswaldkirk, Yorks. -	54 12 „	1 3 „	—	R. Thompson -	S.
Outer Dowsing Lightship -	53 27 „	1 5 E.	—	Light-keepers -	W.
Owers Lightship - -	50 39 „	0 41 W.	—	„ -	W.
Oxford - - -	51 46 „	1 16 „	208	W. Wickham, for E. J. Stone.	T. S.
Parkstone, Dorset -	50 43 „	1 56 „	197	R. H. Barnes -	D.
Penbedw, Mold - -	53 12 „	3 11 „	650	H. W. Buddicom -	C.
Pennant Bay, Aberdour -	57 40 „	2 16 „	—	Coastguard - -	W.
S Pinmore, Girvan - -	55 12 „	4 49 „	187	P. Donald, for Capt. Hamilton.	E.
Plymouth, The Hoe -	50 22 „	4 8 „	116	H. Victor Prigg -	D. F. S.
„ Freedom Fields	50 24 „	4 8 „	207	„ - -	R.
S Poltalloch - - -	56 8 „	5 30 „	132	J. Russell, for Lord Malcolm.	E.
Portrush - - -	55 13 „	6 40 „	—	Coastguard - -	W.
Prawle Point - -	50 12 „	3 43 „	332	M. Holmes - -	T.
Prestwich - - -	53 32 „	2 17 „	294	T. R. H. Clunn	D. F. S.
Roche's Point, Co. Cork -	51 47 „	8 19 „	42	W. Kennedy -	T.
Rochford, Tenbury -	52 18 „	2 36 „	316	Rev. John Tomson -	R. C.
S Rosewell - - -	55 51 „	3 7 „	690	R. W. D. Cameron -	E.

Station.	Lat.	Long.	Height in feet above M.S.L.	Observer.	Nature of Information supplied.
Rothamsted	51° 48′ N.	0° 22′ W.	368	Sir J. B. Lawes and Sir J. H. Gilbert.	F. S.
Rothesay	55 50 „	5 4 „	115	J. Kay	E.
Rounton, Yorkshire	54 24 „	1 18 „	249	Sir I. L. Bell, Bart.	E.
Rousdon, Devon	50 42 „	3 0 „	523	C. E. Peek	E.
Roxborough, Co. Limerick	52 35 „	8 36 „	—	A. W. Shaw	R.
Royal Sovereign Light-ship.	50 43 „	0 27 E.	—	Light-keepers	W.
Rugby	52 22 „	1 15 W.	379	E. Kitchener	G.
St. Ann's Head, Pembroke	51 41 „	5 11 „	150	H. T. Knott	T. S. W.
St. Aubin's, Jersey	49 12 „	2 11 „	25	J. Fisher	T.
St. David's, Pembrokeshire	51 53 „	5 16 „	215	W. P. Propert	D.
St. Helen's, Lancashire	53 28 „	2 45 „	151	J. Robertson	G.
St. Heliers, Jersey	49 11 „	2 6 „	—	Signal Officer, Fort Regent.	S.
St. Leonards	50 51 „	0 33 E.	129	H. Colborne	D. F. S.
Salcombe, Devon	50 14 „	8 46 W.	—	Coastguard	W.
Sandgate, Kent	51 4 „	1 9 E.	56	A. Robert Bowles	R.
Scarborough	54 17 „	0 23 W.	159	H. G. H. Monk and E. W. Ellerbeck.	D. F.
„	54 17 „	0 23 „	—	Coastguard	W.
Schull	51 32 „	9 32 „	—	„	G.
Scilly Islands, St. Mary's	49 56 „	6 18 „	80	A. Hicks	B.S.T.W.C.
Seafield, Miltown Malbay Co. Clare.	52 48 „	9 30 „	—	Coastguard	W.
Seaham Harbour	54 50 „	1 19 „	148	G. H. Aird	D.
Sedbergh	54 19 „	2 32 „	400	A. P. Burra	R.
Seven Stones Lightship	50 4 „	6 5 „	—	Light-keepers	W.
Shambles Lightship	50 31 „	2 20 „	—	„	W.
Sheffield	53 23 „	1 29 „	429	E. Howarth	D.
Shields, North	55 0 „	1 27 „	97	J. W. Irvine	T.
Shields, North, High Light-house.	55 0 „	1 27 „	—	Captain Harrison	B.
Shipwash Lightship	52 2 „	1 38 E.	—	Light-keepers	W.
Skipton	53 58 „	2 9 W.	567	W. Ecroyd	G.
Solihull (Birmingham)	52 28 „	1 48 „	459	B. Boothroyd	F.
Solway Lightship	54 48 „	3 32 „	—	Light-keepers	W.
Southampton	50 55 „	1 24 „	78	J. T. Cook, for Dir. Gen. of Ordnance Survey.	D.F.S.
Southport	53 39 „	2 59 „	—	J. Baxendell	S.
South Rock Lightship	54 25 „	5 22 „	—	Light-keepers	W.
Spidall, Co. Galway	53 15 „	9 17 „	—	Coastguard	G.
Spurn Head	53 34 „	0 7 E.	19	G. Freeman	T.
Spurn Lightship	53 34 „	0 13 „	—	Light-keepers	W.
Stokesay, Craven Arms	52 26 „	2 52 W.	370	Miss M. A. Digges La Touche.	D.
Stonyhurst College	53 51 „	2 28 „	375	Rev. W. Sidgreaves	A.D.F.
Stornoway	58 11 „	6 22 „	28	J. Mackenzie	T.S.C.
„	58 11 „	6 22 „	—	Coastguard	W.
Stowell, Sherborne, Dorset.	50 57 „	2 31 „	376	Rev. H. J. Poole	F.
Stranraer	54 54 „	5 2 „	—	Coastguard	G.
Strathfield Turgiss, Hants	51 20 „	1 0 „	195	The late Rev. C. H. Griffith.	F.
Strathpeffer-Spa, N.B.	57 34 „	4 34 „	253	J. Tregelles Fox	D. S.
Sumburgh Head (Dunrossness).	59 51 „	1 17 „	126	Rev. W. Brand	T. C.
Sunderland	54 54 „	1 23 „	—	Coastguard	W.
Sutton Coldfield	52 34 „	1 49 „	392	C. F. Marston	S.
Symbister, Shetlands	60 14 „	1 25 „	—	J. S. Nicolson	G.
Syston, Leicester	52 43 „	1 5 „	178	S. K. Daniels	R.
Tealby, Lincolnshire	53 24 „	0 16 „	251	Rev. S. Lewin	D.
Teelin, Co. Donegal	54 38 „	8 39 „	—	Coastguard	W.
Tenby	51 41 „	4 42 „	79	J. E. Gower	S.
Thurcaston, Leicester	52 42 „	1 10 „	253	Rev. T. A. Preston	S.
Torquay	50 28 „	3 31 „	—	A. Chandler	S.
Totland Bay, Isle of Wight	50 41 „	1 33 „	84	J. Dover	G.
Union Hall, Co. Cork	51 33 „	9 8 „	—	Coastguard	G.
Uppingham	52 35 „	0 44 „	484	Rev. G. H. Mullins	D.
Uzon (Montrose)	56 40 „	2 28 „	—	Coastguard	W.
Valencia Observatory, Cahirciveen.	51 56 „	10 15 „	30	J. E. Cullum	A. T. C.
„ Island, Glanleam	51 56 „	10 20 „	—	Miss E. FitzGerald	R.
„ Knightstown	51 55 „	10 20 „	—	Coastguard	G.
Wakefield	53 41 „	1 30 „	96	H. Clarke	E.
Waterford	52 66 „	7 7 „	—	Harbour Authorities	C.

	Station.	Lat.		Long.		Height in feet above M.S.L.	Observer.	Nature of Information supplied.
	Westbourne, Sussex -	50 52	N.	0 55	W.	—	Rev. L. B. Birkett -	S.
	Westray, Orkney - -	59 17	„	3 0	„	—	J. Hewison - -	G.
	Wick - - - -	58 27	„	3 6	„	80	J. Sinclair - -	T.
	„ - - - -	58 27	„	3 6	„	—	Coastguard - -	W.
S	Wolfelee - - -	55 23	„	2 39	„	587	W. Cockburn -	D.
	Worksop - - -	53 18	„	1 8	„	—	H. Mellish - -	S.
	Yarmouth - - -	52 37	„	1 43	E.	10	G. T. Watson -	B.T.C.
	„ Isle of Wight -	50 42	„	1 29	W.	—	Coastguard - -	G.
	Ynis-y-bro, Newport -	51 38	„	3 3	„	115	D. Morgan - -	R.
	York, Boothgate - -	53 57	„	1 5	„	—	J. E. Clark - -	S.
	„ The Museum -	53 57	„	1 5	„	51	H. M. Platnauer -	D. T.

In addition to those already mentioned, reports are received daily from the following Continental Stations.

Station.	Authority.	Station.	Authority.
Haparanda - -	Meteorological Office, Stockholm.	†The Helder - -	Bureau Central Météorologique, Paris.
Hernösand - -		Brussels - - -	
†Stockholm - -		Cape Gris Nez - -	
Wisby - - -		†Brest (S.t. Mathieu) -	
Karlstad - -		Lorient (Île de Groix) -	
Bodö - - -	Meteorological Institute, Christiania.	*†Rochefort (Ile d' Aix) -	
†Christiansund - -		†Biarritz - - -	
*†Skudesnaes - -		†Paris - - -	
Færder - - -		Belfort - - -	
		Lyons - - -	
		Nice - - -	
		Perpignan - - -	
†The Scaw - -	Meteorological Institute, Copenhagen.	Berlin - - -	Cent. Met. Inst. of Germany.
Fanö - - -		Wiesbaden - - -	
		Munich - - -	
Cuxhaven - - -	Deutsche Seewarte, Hamburg.	Corunna - - -	Observatory, Lisbon.
		†Lisbon - - -	
		Azores (P. Delgada) -	

Note.—The stations marked with an asterisk (*) report also at 2h. p.m., and those with a dagger (†) at 6h. p.m.; Lisbon reports at 4h. p.m. instead of 6h. p.m.
The Helder does not send reports at 6 p.m. on Sundays.

APPENDIX XII.

List of Documents received from Foreign Land Stations during the year ending March 31st, 1896.

Place.	Observer.	Nature of Observations.
Abaco (Bahamas) - -	T. R. Thompson, Sen., Lightkeeper	, January to December.
Aburi (Gold Coast) - -	W. Crowther, H. Eyre, C. H. Humphries, and W. Murray.	1894, January to December; 1895, January to December.
Accra „ „ - -	J. F. Easmon, M.D., W. R. Henderson, W. A. Murray, and J. Gordon-Smith.	Two observations daily, 1894, January to December; 1895, January to December.
Ada „ „ - - -	C. Macmaster - - -	Two observations daily, 1895, October to December.
Antigua - - -	Francis Watts - - -	„ „ „ „ March to December; 1896, January, February.
Axim (Gold Coast) - -	T. C. Johnson - - -	„ „ „ „ October to December.
Bahamas - - - -	- - - - -	Reports on the hurricane at Abaco, Biminis, and Grand Bahama, on October 21 to 22, 1895.
Barbados - - - -	J. R. Bovell - - -	Monthly summary of two observations daily, 1895, January to December; 1896, Jan
Beyrout (Lee Observatory) -	R. H. West, M.A. - - -	Two , 1895, March to December; 1896, January, February.
Breaksea Island (King George's Sound).	J. Tattersall - - -	Lighthouse Register, 1894, July to December.
Cape	S. H. R. V. R. de Groot - -	Daily rainfall, 1895, October to December.
Cape.	L. S. Carter - - -	Two observations daily, 1895, March to May.
Capel	G. K. Broom, Lightkeeper - -	Lighthouse Register, 1895, January to December.
Cape	E. C. Hathaway, Lloyd's Signalman.	Two observations daily, 1895, March to December; 1896, January, February.
Cay Lobos (Bahamas) - -	Lightkeeper - - -	Lighthouse Register, 1895, January to December.
Cay Sal (Bahamas) -	J. T. Farrington, Lightkeeper -	„ „ 1894, July to December; 1895, January to June.
Famagusta (Cyprus) - -	G. Eliades - - -	Two observations daily, 1895, January to December.

George Town (British Guiana) -	Robert Ward - -	Two observations daily, 1895, February to December; 1896, January.
" " " " -	" " - - -	Daily record of sunshine, 1895, February to December; 1896, January.
Gibraltar - - - -	Sergeant A. W. Harwood, Med. Staff Corps, and Corporal E. E. Ward, Med. Staff Corps.	Two observations daily 1895, March to December; 1896, January, February.
Inagua (Bahamas) - -	S. W. Hall, Lightkeeper - -	Lighthouse Register, 1895, January to December.
Kubé Kur (Gold Coast) - -	W. L. Bennett and P. Q. Welsing -	One observation daily, 1896, January and February.
Kwitta " " - -	W. R. W. James - - -	Two observations daily, 1895, October to December.
Kyrenia (Cyprus) - -	P. Michaelides - - -	" " " " January to December.
Lagos - - - -	Wm. A. Cole, J. Julius Apena, and T. B. Wright.	" " " " February to December; 1896, January, February.
Larnaca (Cyprus) - -	C. Perini - - - -	" " " " January to December.
Limassol (Cyprus) - - -	Luigi Béraud - - -	" " " " " "
Malden Island - - -	- - - - -	" " " " January to July.
Marimembe, Mengo, Uganda -	Rev. E. Millar and Rev. A. J. Pike	One observation daily, 1895, May, October, November.
Nassau, Bahamas - -	J. A. Kerr - - - -	" " " " September to December; 1896, January, February.
New Georgia, Solomon Islands -	- - - - -	Summary of observations taken during survey by H.M.S. "Penguin," in 1893–95, with notes on gales.
Nicosia (Cyprus) - -	E. Ioannides - - -	Two observations daily, 1895, January to December.
Papho (Cyprus) - - -	E. A. Malliotis and M. Theodorides	" " " " " "
Point King (King George's Sound).	S. Mitchell - - -	Lighthouse Register, 1894, July to December; 1895, January to December

List of Documents—*continued.*

Place.	Observer.	Nature of Observations.
Rarotonga - - -	J. Scard - - -	Two observations daily, 1894, December.
St. Helena - - -	H. S. Hands - - -	One observation daily, 1895, January to December; 1896, January.
„ - - -	„ - - -	Continuous record of wind (direction and velocity), 1895, January to December; 1896, January, February.
St. Kitts (Basseterre) - -	E. A. Hancock, F.C.S. - -	Two observations daily, 1895, January to November.
St. Lucia (Morne Fortuné) -	- - - - -	Monthly summary of observations for 1894.
Sierra Leone - - -	G. A. Coker, Medical Clerk -	Two observations daily, 1895, August to December; 1896, January to February.
Sombrero - - -	J. A. Richardson and A. L. Richardson.	Lighthouse Register, 1895, April to September.
Suva (Fiji) - - -	J. D. W. Vaughan, F.R.Met. Soc., F.R.G.S.	One observation daily, 1895, January to December; 1896, January, February.
Teneriffe (Sitio de Cullen) -	A. F. Perry - - -	Two observations daily, 1895, February to December; 1896, January, February.
„ „ „ - -	„ - - -	Continuous record of pressure, 1895, February to December; 1896, January.
„ „ „ - -	„ - - - -	„ „ temperature, 1895, February to July, October to December; 1896, January.
Tobago - - - -	Quinten H. Spicer - - -	Two observations daily, 1895, October to December; 1896, January.
Tongoa (New Hebrides) - -	A. Cronstedt - - -	„ „ „ „ January to December; „ „
Trinidad - - - -	J. H. Hart, Supt. Botanic Gardens -	„ „ „ „ February to December.
„ - - - -	„ „ „ „ -	Daily record of sunshine, 1895, March to December; 1896, January.
Watling Island (Bahamas) -	T. R. Thompson, jun., Lightkeeper -	Lighthouse Register, 1895, January to December.
Zomba, British Central Africa -	John McClounie - -	Two observations daily, 1895, January to April.

APPENDIX XIII.

Accessions to the Library during the Year ending 31st March 1896.

Adelaide Observatory.—Meteorological observations made at the Adelaide observatory, and other places in South Australia and the northern territory, during the years 1891–93, under the direction of Sir C. Todd. 3 vols. sm. f°. Adelaide, 1894–96.

[———] Rainfall in South Australia and the northern territory during 1893; with weather characteristics of each month. By Sir C. Todd. f°. Adelaide, 1895.

Akassa.—Klima an der Niger-Mündung. sm. f°. (*Meteor. Zeitschr.*, 1896, *März, p.* 102.)

Åkerblom, P.—Sur la distribution, à Vienne et à Thorshavn, des éléments météorologiques autour des minima et des maxima barométriques. Communiquée le 14 Nov. 1894. 8°. Stockholm, 1895. (*K. Svenska Vet.-Akad. Handl.*, xx., *Afd.* i., No. 3.)

[Algiers, Service Météorologique du Gouvernement Général de l'Algérie.]—Bulletin météorologique de l'Algérie. 1895, Jan. 1–Dec. 31. sm. f°. Sheets.

Algué, J.—Baguios ó tifones de 1894. See Manila, Observatorio Meteorológico.

[Allahabad, Meteorological Office.]—Brief sketch of the meteorology of the North-Western Provinces and Oudh and adjacent parts of Rajputana and the Panjab, 1894. sm. f°. s.l.e.a.

Allingham, W.—Fast passages and best routes. Read before the Shipmasters' Society, 21 Nov. 1895. 8°. London, 1895.

——— Ocean meteorology. Read before the Shipmasters' Society. 8°. London, 1891.

American Meteorological Journal.—A monthly review of meteorology. Vol. xi., 1894–95. la. 8°. Boston, s.a.

Amsterdam, Kon. Nederlandsch Aardrijkskundig Genootschap.—Tijdschrift. Tweede serie. Deel xii. 2 vols. 8°. Leiden, 1895.

* ‖ **Andrews, Thomas.**—On the constitution and properties of ozone. Read June 21, 1855. la. 4°. (*Phil. Trans.*, 1856, *p.* 1.)

Antigua, Government Laboratory.—Meteorological register for 1895. f°. Dated, Antigua, 1896.

Aratus.—A literal translation of the astronomy and meteorology of Aratus. *See* Prince, C. L.

* **Arbuthnot, J.**—An essay concerning the effects of air on human bodies. 8°. London, 1751.

‖ * **Assmann, R.**—Der Einfluss der Gebirge auf das Klima von Mitteldeutschland. la. 8°. Stuttgart, 1886. (*Forschungen zur deutschen Landes- und Volkskunde*, I., 6, *p.* 311.)

Åstrand, J. J.—Ny Seismometer. 4°. Bergen, 1895.

‖ **Augustin, F.**—Meteorologická pozorováni z rozhledny na Petrině v Praze roku 1894. la. 8°. V. Praze, 1894. (*Věstn. Česk. Akad. Frant. Josef.*)

‖ ——— Resultate der meteorologischen Beobachtungen auf der Petrinwarte in Prag. la. 8°. Prag, 1894. (*Sitzungsb. k. böhm. Gesellsch. Wissensch., math.-naturw. Cl.*, 1894, No. xli.)

Azambuja, G. A. de.—Annuario do Estado do Rio Grande do Sul., 1896. Anno. xii. sm. 8°. Porto Alegre, 1895.

Note.—Books marked * have been acquired by purchase; the others are donations from institutions, societies, or authors. Those marked ‖ are excerpt papers, extra copies of which have been separately printed.

In some cases additional publications have been received besides those specified, but only completed volumes or years are given here.

Baltimore, Maryland State Weather Service.—Monthly report, iv., 1894–95. 4°. s.l.e.a.

Bangalore, Mysore Government Meteorological Department.—Report on rainfall registration in Mysore for 1894, by J. Cook. la. 4°. Bangalore, 1895.

Barker, D. Wilson.—Clouds and weather: a study for navigators. 8°. London, 1895.

Bathurst, Gambia.—Comparative rainfall, Colony of the Gambia, 1890–94, 1891–95, and meteorological observations, 1894, 1895. sm. f°. Sheets.

|| **Bayard, F. C.**—A comparison between the Jordan and the Campbell-Stokes sunshine recorders. la. 8°. (*Quart. Journ. R. Meteor. Soc.*, xvi., 1890, *p.* 20.)

|| ——— English climatology, 1881–90. la. 8°. (*Quart. Journ. R. Meteor. Soc.*, xviii., 1892, *p.* 213.)

Bayard, F. C., and Marriott, W.—The frost of January and February 1895 over the British Isles. la. 8°. (*Quart. Journ. R. Meteor. Soc.*, xxi., 1895, *p.* 141.)

Bebber, W. J. van.—Das Sturmwarnungswesen an der deutschen Küste und Vorschläge zur Verbesserung desselben. Vortrag, gehalten in der Naturf.-Versammlung zu Lübeck im Sept. 1895. la. 8°. (*Ann. Hydr. mar. Meteor.*, 1895, *Sept.*)

* ——— Hygienische Meteorologie. la. 8°. Stuttgart, 1895.

|| ——— Der Wetterdienst an der Deutschen Seewarte. la. 8°. (*Ann. Hydr. mar. Meteor.*, 1895, *Okt.*)

Belize, Public Hospital.—Meteorological observations, 1894, May–Dec.; 1895, Jan.–Dec. sm. f°. Sheets.

——— **St. Joseph's Observatory.**—Summary of meteorological observations. 1895, Jan.–Dec. 4°. Sheets. (*The Angelus, Belize*, 1895–96.)

* **Bergh, A.**—An essay on the causes of distant alternate periodic inundations over the low lands of each hemisphere . . . to which is subjoined a table connecting the two sister sciences of astronomy and geology. 8°. London, s.a.

Berlin, Königlich Preussisches Meteorologisches Institut.—Bericht des Internationalen Meteorologischen Comité's und der Internationalen Commission für Wolkenforschung.

See Upsala.

——— ——— Bericht über die Thätigkeit . . . im Jahre 1894 von W. von Bezold. la. 8°. Berlin, 1895.

——— ——— Ergebnisse der Gewitter-Beobachtungen, 1891. la. 4°. Berlin, 1895.

——— ——— Ergebnisse der meteorologischen Beobachtungen in Potsdam. 1893, 1894. 2 vols. la. 4°. Berlin, 1895.

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APPENDIX XIV.

ACCOUNT of RECEIPTS and PAYMENTS for the year ending 31st March 1896.

RECEIPTS.	£	s.	d.	PAYMENTS.	£	s.	d.	£	s.	d.
Balance from year 1894–95 -	1,442	10	11	ADMINISTRATION:						
Parliamentary Vote - -	15,300	0	0	Payment of Council -	991	5	0			
Repayment of expenses charged under—				Secretary - -	800	0	0			
	£	s.	d.	Salaries and wages -	904	10	9			
(1.) Incidental expenses -	8	7	0	Rent, fuel, and lighting	719	13	4			
(2.) Observatories -	25	13	2	Incidental and contingent expenses -	218	11	10			
				Furniture and fittings	134	14	0			
	34	0	2	Expenses incidental to International Meteorological Congress -	4	18	0			
				Pensions - -	144	0	0			
								3,917	12	11
SUPPLY OF INFORMATION:				SPECIAL RESEARCHES:						
Daily Weather Charts and Forecasts -	270	17	5	Salaries and other charges - -	-	-	-	946	6	3
6 p.m. Charts -	25	0	0	LAND METEOROLOGY:						
Reports for Press Agencies, &c. -	126	2	0	Observatories and stations, including remuneration of observers - -	2,262	1	9			
Telegrams sent abroad - -	201	2	7	Salaries: —Discussion and reduction of observations, &c. -	1,432	11	3			
	623	2	0					3,694	13	0
SALE OF INSTRUMENTS, &c.:				WEATHER INFORMATION AND FORECASTS:						
Royal Navy account - -	2	2	11	Telegraphic reports and storm warnings, remuneration of observers, &c. -	2,562	11	6			
Mercantile Marine account -	21	1	10	Salaries: — Preparation and issue of reports and forecasts -	1,885	15	3			
M.O. (Stations) account -	26	10	9					4,448	6	9
	49	15	6	INSPECTIONS:						
Repayment of Miscellaneous Commissions executed for Colonial and Foreign Institutions, &c. - -	56	16	8	Salaries and travelling expenses - -	-	-	-	519	4	0
Commission charged on work done for Colonies, &c. -	5	1	0	OCEAN METEOROLOGY:						
				Salaries: —Discussion and reduction of observations - -	1,588	16	4			
				Expenses incidental to the supply of instruments: —						
				Proportion for care and issue of instruments - -	200	0	0			
				Royal Navy -	669	16	6			
				Mercantile Marine -	278	2	7			
				Distant island and coast stations -	12	9	4			
								2,749	4	9
				Miscellaneous Commissions executed for Colonial and Foreign Institutions, &c. - -	-	-	-	63	15	8
				BALANCE:						
				Cash at Bank -	1,113	13	11			
				„ at Office -	58	9	0			
								1,172	2	11
£	17,511	6	3				£	17,511	6	3

APPENDIX XV.

List of the Principal Papers printed in various Reports issued by the Office from the Year 1866.

I.—Daily Weather Report.

Year.	Page.	——
1891 (July to Dec.).	1	Mean Values of Barometric Pressure for each Month and for the Whole Year—derived from Observations made at 8 a.m. daily during the 20 Years 1871–90.
1891	2 and 3	Mean Values of the Dry Bulb and Wet Bulb Temperatures for each Month and for the Whole Year, derived from Observations made at 8 a.m. daily during the 20 Years 1871–90.
„	4 and 5	Mean Values of the Daily Maximum and Minimum Temperatures, and of the Maximum and Minimum combined, for each Month and for the Whole Year—derived from Observations extending over the 20 Years 1871–90.
„	6	Mean Rainfall for each Month and for the Whole Year—derived from Observations extending over the 25 Years 1866–90.

II.—Weekly Weather Report.

Year.	Page.	——
1884	V.	Table A.—Showing for each Degree of Latitude, from 49° N. to 58° N. the Total Number of Hours during which the Sun is above the Horizon, in each Month of the Four Quarters of the Year.
„	VI.	Table B.—Showing for each Degree of Latitude, from 49° N. to 58° N. the Total Number of Hours during which the Sun is above the Horizon, in each Week of the Year.
1889	[1]	Summaries of Rainfall and Mean Temperature, for the First, Second, Third, and Fourth Quarters, and for the Whole Year, during the Twenty-four Years 1866 to 1889. [Contains Separate Yearly Values from the year 1866.]
1891	VI.–VII.	Table I.—Showing for the Stations included in the Weekly Weather Reports and Monthly Summaries, the Mean Values of the Daily Maximum and Minimum Temperatures, and of the Maximum and Minimum combined, for each Month and for the Whole Year, derived from Observations extending over the Twenty Years 1871–90.
„	VIII.	Table II.—Showing for the Stations included in the Weekly Weather Reports and Monthly Summaries, the Mean Rainfall for each Month and for the Whole Year, derived from Observations extending over the Twenty-five Years 1866–90.
„	IX.	Table III.—Showing, for each Month and the Whole Year, for certain Stations included in the Weekly Weather Reports and Monthly Summaries, the Mean Numbers of Hours of Bright Sunshine, together with the Per-centages of the Possible Duration, in each instance, derived from Records extending over the Ten Years 1881–90.
1895	[1]	Summaries of Rainfall and Mean Temperature, for the First, Second, Third, and Fourth Quarters, and for the Whole Year, during the Thirty Years, 1866 to 1895. [For Separate Yearly Values for 1866–89, *see* 1889 [1–9].]
„	[17]	Table I.—Showing for each District, during each of the Three Lustra, and the whole Period comprehended in the Fifteen Years 1881–95, the Mean Aggregate numbers of rainy days from the beginning of the Year to the end of each week in the Year.

Year.	Page.	——
1895	[23]	Table II.—Showing for each District, during each of the Three Lustra, and the whole Period comprehended in the Fifteen Years 1881–95, the Mean Aggregate Amounts of Rainfall, from the beginning of the Year to the end of each week in the Year.
„	[27]	Table III.—Showing for each District, during each of the Three Lustra, and the whole Period comprehended in the Fifteen Years 1881–95, the Mean Aggregate Values for Accumulated Heat above 42° F., from the beginning of the Year to the end of each week in the Year.
„	[32]	Table IV.—Showing for each District, during each of the Three Lustra, and the whole Period comprehended in the Fifteen Years 1881–95, the Mean aggregate Values for Accumulated Heat below 42° F., from the beginning of the Year so the end of each week in the Year.
„	[37]	Table V.—Showing for each District, during each of the Three Lustra, and the whole Period comprehended in the Fifteen Years 1881–95, the Mean Aggregate Numbers of Hours of Bright Sunshine from the beginning of the Year to the end of each week in the Year.
„	[42]	Table VI.—Showing for each District, during each of the Three Lustra, and the whole Period comprehended in the Fifteen Years 1881–95, the Mean Per-centages of the possible amount of Bright Sunshine, from the beginning of the Year to the end of each week in the Year.
„	[47]	Table showing in Degrees Fahrenheit for each District, during each of the Three Lustra, and the whole Period comprehended in the Fifteen Years 1881–95, the Mean Temperature of the Air, for each Week in the Year.

III.—Monthly Weather Report.

Year.	Page.	——
1884	[iii.]	Table showing for each Month and for each Degree of Latitude from 18° N. to 49°N. the Total Number of Hours during which the Sun is above the Horizon.
„	[i.]	On London Rain. By W. J. Russell, Ph.D., F.R.S.
„	[ii.]	On the Amount of Carbonic Acid in London Air. By W. J. Russell, Ph.D., F.R.S.
1885	[i.]	On the Impurities in London Air. By W. J. Russell, Ph.D., F.R.S.
„	[ii.]	Table showing the Mean Monthly and Annual Rainfall at the Weekly and Monthly Weather Report Stations for the 20 Years 1866 to 1885.

IV.—Quarterly Weather Report.

Year.	Page.	——
1869	43	Factors for Calculation of Gradients.
„	[1]	Notes on Easterly Gales, by R. H. Scott.
1870	iii.	Description of Observatories, with illustrations of thermometer screens.
„	[7]	Mean Barometrical Pressure at Telegraphic Reporting Stations, 1866–70.

Year.	Page.	——
1870	[23]	Bessel's Paper on the Determination of the Law of a Periodical Phenomenon. Translated from the Astronomische Nachrichten, 136, for May, 1828.
1871	[7]	Discussion of Anemometrical Results for Orkney, 1863–68.
„	[59]	Constants for the Determination of the Monthly March of Atmospherical Pressure, &c. at the Seven Observatories for 1869–70.
1872	[13]	Discussion of the Anemometrical Results at Bermuda from 1st April 1859 to 31st March 1863.
1873	[13]	Rainfall of the London District for Sixty Years, 1813–72. By G. Dines, F.M.S., [with diagram].
1874	[26]	On the Winds at Liverpool, by W. W. Rundell.
1875	[1]	Observations taken at Nine Stations of the Second Order, [1875].
„	[89]	Mean Monthly Results for the Seven Observatories for the Lustrum, 1871–75.
1876	[13]	Report on the Reduction of Greenwich Curves for 1875 to a Common Standard with those of Kew [with 25 plates].
„	[20]	Results of Observations made at the Pagoda, Kew Gardens, to Determine the Influence of Height on Temperature, &c. By R. H. Scott, F.R.S. [4 plates.]
„	[39]	Comparison of Results obtained by means of the Harmonic Analyser, with similar Results got from Measurement and Numerical Calculation for the Seven Observatories.
1877	[13]	On the Diurnal Range of Rainfall at the Seven Observatories in connexion with the Meteorological Office, 1871–80. By R. H. Scott, F.R.S. [5 plates.]
„	[35]	Report on Evaporimeters. By W. N. Shaw, M.A. [2 plates.]
1878	[13]	On the Computation of the Quantity of Heat in excess of any Fixed Base Temperature, received at any place during the course of the Year, &c. By Lieut.-Gen. Strachey, R.E., F.R.S.
1879	[41]	Report on Hygrometric Methods, &c. Part I. By W. N. Shaw, M.A.
1880	[13]	Report on Experiments made at the Kew Observatory with Thermometer Screens of different patterns during 1879, 1880 and 1881, by G. M. Whipple, Superintendent.
„	[19]	Tables and Diagrams illustrating the Diurnal Range of Barometric Pressure in the British Isles during the Years 1876–80. By F. C. Bayard, L.L.M., F.R. Met. Soc. [5 plates.]

V.—Report of the Meteorological Committee of the Royal Society.

Year.	Page.	——
1867	27	A Description of the Self-Recording Instruments recently erected by the Meteorological Committee of the Royal Society in various parts of the United Kingdom [with plates].
1869	25	Note upon a Self-registering Thermometer adapted to Deep-Sea Soundings, by W. A. Miller, M.D., Treasurer and V.P.R.S., extracted from Proceedings of Royal Society, vol. XVII., p. 482.
„	32	On the Principle of the Pantagraph, designed by F. Galton.
„	36	Description of a Self-Recording Rain-gauge, invented by Robert Beckley, of the Kew Observatory; made by James Hicks, London.
1870	25	Description of the Process by which the Traces of the Self-registering Instruments are reduced suitably for publication.
„	31	Description of the Pantagraph, designed by Mr. Galton.
1871	24	„ „ Trace Computer, designed by Mr. Galton.

Year.	Page.	——
1872	27	A Summary of the Results obtained from the Discussion of the Information for Square 3, being the Region of the Doldrums in the Atlantic. By Capt. H. Toynbee, Marine Superintendent.
1873	26	Summary of the General Course of Action taken at the Meteorological Congress at Vienna in 1873.
1874	33	The International Maritime Conference.
1876–77	31	Index of the Information existing in the Office for the entire Ocean [with charts].

Va.—Report of the Meteorological Council.

Year.	Page.	——
1877–78	21	Account of the Experiments on Atmospheric Electricity conducted at Kew Observatory. By Prof. J. D. Everett.
1879–80	28	On the Effect of Sluggishness on the Readings of Marine Barometers on Shore, by Prof. Stokes.
„	32	Description of the Card Supporter for Sunshine Recorders adopted at the Meteorological Office, by Prof. Stokes.
„	43	On the Methods available for the Determination of the Humidity of the Atmosphere, by Mr. W. N. Shaw.
„	46	Memorandum as to the Employment of the Harmonic Analyser in the Meteorological Office, by Prof. Stokes.
1880–81	25	On the Working of the Harmonic Analyser. [Prof. Stokes.]
„	27	Report on Fogs. [W. J. Russell.]
„	28	„ „ Hygrometers and Evaporimeters, presented to the Meteorological Council, May 10, 1881. [W. N. Shaw.]
„	33	Preliminary Report on the Photo-Nephograph. [W. de W. Abney.]
1881–82	25	On Fogs. [W. J. Russell.]
„	25	Preliminary Report on Hygrometry. [W. N. Shaw.]
„	29	Report on the Results of a Tentative Reduction of a Year's Electrograms at the Kew Observatory. [G. M. Whipple.]
1882–83	27	On the Results obtained by the use of the Harmonic Analyser.
1884–85	22	Note on Work done with the Harmonic Analyser.
1885–86	22	Memorandum on Cloud Photography, by Prof. Stokes, F.R.S.
1886–87	21	On the Distribution of Gales round the Coasts of the British Isles [for the 15 years, 1871–85].
„	23	Report on Occasional Telegrams received from Ben Nevis. [F. Gaster.]
„	24	Report on the Daily Weather Messages received from the United States (viâ Paris) during the three months January to March 1887. [F. Gaster.]
1887–88	22	On the History of the Severe Storms which visited the British Isles between August 1, 1882, and September 3, 1883, as traceable from the Atlantic Charts published by the Office. By Robert H. Scott, F.R.S., Secretary.
„	30	Abstract of Report on Hygrometric Methods, by W. N. Shaw, M.A., reprinted from the "Proceedings of the Royal Society," No. 262.
1888–89	22	Notes of some Results of an Examination of Atlantic Charts published by the Office, by R. H. Scott, F.R.S., Secretary.
„	27	Memorandum on the Measurement of Squalls shown on the Traces yielded by Robinson Anemometers of the "Standard" Pattern, by R. H. Curtis.
1889–90	24	Code of Regulations, &c. for conducting the work at the First Class Observatories, and the Examination thereof. [See also Report, 1868.]

Year.	Page.	——
1889–90	36	Note on Experiments on Pressure of Wind made by Mr. W. H. Dines.
„	46	Experiments with Violle's Actinometer Apparatus.
„	47	On the Work done with the Harmonic Analyser at the Meteorological Office.
1890–91	22	On Mr. Dines's Anemometer Experiments.
1891–92	23	On Anemometer Comparisons carried out by the aid of a Grant from the Meteorological Council, by W. H. Dines, B.A.
1892–93	21	On the Construction of the Anemometer recently erected for trial on the roof of the Meteorological Office, by W. H. Dines, B.A.
„	27	On the Harmonic Analysis of Hourly Observations of Air Temperatures at British Observatories, by Lieut.-Gen. R. Strachey, F.R.S.
1893–94	20	Report on the Performance of the Pressure-Tube Anemometer on the Roof of the Meteorological Office, by Mr. R. H. Curtis.
1894–95	22	Report to the Council of the University Extension College at Reading on Hay Harvest Forecasts during the Hay Harvest of 1894, by H. N. Dickson.
„	27	Report on the Comparisons made between two Pressure Tube Anemometers on the roof of the Meteorological Office, by R. H. Curtis.

VI.—Hourly Readings of the Self-Recording Instruments of the Observatories in connexion with the Meteorological Office.

Year.	Page.	——
1883	[1]	Constants of formulæ expressing the mean daily range of temperature obtained by the use of the Harmonic Analyser.
1884	[1]	Tables and formulæ to facilitate the computation of harmonic coefficients. By Lieut.-General Strachey, R.E.

VII.—Hourly Means of the Readings obtained from the Self-Recording Instruments at the Five Observatories under the Meteorological Council.

Year.	Page.	——
1891	[1]	Tables of Hourly Sunshine Values, with Plates, for the Ten years 1881–90, for Seven Observatories.

VIII.—Meteorological Observations at Stations of the Second Order.

Year.	Page.	——
1891	[186]	Results of Observations at Stations of the Second Order for the Fifteen years, 1876–1890.

APPENDIX XVI.

LIST OF PUBLICATIONS issued under the Authority of the Meteorological Council.

OFFICIAL.

No. 1. Report of the Meteorological Committee for 1867. 1*s.*
2. Instructions for Meteorological Telegraphy. New Edition, 1891. Prepared for the use of observers exclusively.
3. Fishery Barometer Manual. (New edition, 1887.) 6*d.*
4. Charts showing the Surface Temperature of the South Atlantic Ocean in each Month of the Year. 2*s.* 6*d.*
5. Report of the Meteorological Committee for 1868. 5*d.*
6. Report of the Meteorological Committee for 1869. 10*d.*
7. Quarterly Weather Report for 1869.—Parts I. to IV. 5*s.* each.
8. Barometer Manual. (Out of print. See Nos. 3, 24, 40, 60, and 61.)
9. Quarterly Weather Report for 1870.—Parts I. to IV. 5*s.* each.
10. Report of the Meteorological Committee for 1870. 10*d.*
11. Contributions to our Knowledge of the Meteorology of Cape Horn and the West Coast of South America. 2*s.* 6*d.*
12. Currents and Surface Temperature of the North Atlantic Ocean, from the Equator to Lat. 40° N., for each month of the year, with a General Current Chart. 2*s.* 6*d.*
13. A Discussion of the Meteorology of that Part of the Atlantic lying North of 30° N., for the Eleven Days ending 8th February 1870. With Book of Charts, 5*s.*
14. Quarterly Weather Report for 1871.—Parts I. to IV. 5*s.* each.
15. Report of the Meteorological Committee for 1871. 10*d.*
16. Quarterly Weather Report for 1872.—Parts I. to IV. 5*s.* each.
17. Report of the Meteorological Committee for 1872. 1*s.*
18. Contributions to our Knowledge of the Meteorology of the Antarctic Regions. 2*s.*
19. Quarterly Weather Report for 1873.—Parts I. to IV. 5*s.* each.
20. Charts of Meteorological Data for Square 3. Lat. 0°—10° N. Long. 20° — 30° W., and Remarks to accompany the Monthly Charts, which show the Best Routes across the Equator for each Month, &c. 20*s.*
21. Report of the Proceedings of the Meteorological Congress at Vienna. 1873. 1*s.*
22. Report of the Meteorological Committee for 1873. 4*d.*
23. Report of the Proceedings of the Conference on Maritime Meteorology held in London, 1874. 2*s.*
24. Instructions in the Use of Meteorological Instruments. [Reprinted 1892.] (New edition in course of preparation.) 2*s.* 6*d.*
25. Quarterly Weather Report for 1874.—Parts I., II., and IV., 5*s.* each. Part III., 5*s.* 9*d.*

No. 26. Report of the Meteorological Committee for 1874. 6*d.*
27. Charts of Meteorological Data for the Nine 10° Squares of the Atlantic which lie between 20° N. and 10° S., and extend from 10° to 40° W., with accompanying Remarks, ending with the Best Routes across the Equator. 24*s.*
28. Contribution to the Meteorology of Japan. By Staff-Commander Thomas H. Tizard, H.M.S. *Challenger.* 1*s.*
29. Report of the Meteorological Committee for 1875. 4*d.*
30. Quarterly Weather Report for 1875.—Parts I.—IV. 5*s.* each.
31. Report of the Meteorological Committee for 1876–7. 3*s.* 5*d.*
32. The Meteorology of the North Atlantic during August 1873, with 31 Synoptic Charts. With Book of Charts. 15*s.*
33. Quarterly Weather Report for 1876 (New Series).—Part I., 6*s.*; Parts II., III., and IV., 5*s.* each.
*33A. Meteorological Observations at Stations of the Second Order for the year 1876.
33B. Meteorological Observations at Stations of the Second Order for the year 1877.
34. Contributions to our Knowledge of the Meteorology of the Arctic Regions.—Vol. I.: Part I., 2*s.*; Part II., 10*s.*; Part III., 6*s.*; Part IV., 5*s.*; Part V., 6*s.*
35. Report of the Meteorological Council for 1877–8. 1*s.*
36. Report of the Proceedings of the Second International Meteorological Congress at Rome, 1879. 1*s.* 6*d.*
37. Report on the Meteorology of Kerguelen Island. By Rev. S. J. Perry, S.J., F.R.S. 3*s.*
38. Report of the Meteorological Council for 1878–9. 5*d.*
39. Meteorological Observations at Stations of the Second Order for the year 1878. 20*s.*
40. Aids to the Study and Forecast of Weather, by W. Clement Ley, M.A. 1*s.*
41. Report of the Meteorological Council for 1879–80. 1*s.*
42. Report of the Meteorological Council for 1880–81. 1*s.* 2*d.*
43. Meteorological Charts for the Ocean District adjacent to the Cape of Good Hope, with accompanying Remarks. Charts, 25*s.*; Remarks, 7*s.*
44. Report on the Gales experienced in the Ocean District adjacent to the Cape of Good Hope, between Lat. 30° and 50° S., and Long. 10° and 40° E., by Capt. H. Toynbee, F.R.A.S. 7*s.* 6*d.*
45. Meteorological Observations at Stations of the Second Order for the year 1879. 20*s.*
46. Report on the Storm of October 13–14, 1881. By Robert H. Scott, F.R.S. 1*s.* 6*d.*
47. Rainfall Tables of the British Isles for 1866–80. Compiled by G. J. Symons, F.R.S. 7*s.* 6*d.*
48. Report of the Meteorological Council for 1881–2. 1*s.*
49. Quarterly Weather Report for 1879. (New Series.) Parts I., II., and III., 6*s.* each; Part IV., 5*s.* 6*d.* Appendices and Plates. 27*s.*
50. Quarterly Weather Report for 1880. (New Series.) Parts I. and II., 6*s.* each; Part III., 4*s.*; Part IV., 6*s.* Appendices and Plates. 28*s.*

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* The Observations at Stations of the Second Order for the years 1873–1875 will be found in the Quarterly Weather Reports for the respective years.

LIST OF PUBLICATIONS—*continued.*

No. 51.* Hourly Readings from the Self-Recording Instruments at the Seven Observatories under the Meteorological Council, 1881. (New Series.) Part I., 10*s.* 6*d.* Parts II., III., and IV., 21*s.* each.

52. Quarterly Weather Report for 1877. (New Series.) Part I., 10*s.*; Part II., 5*s.*; Part III., 4*s.* 6*d.*; Part IV., 6*s.* Appendices and Plates. 27*s.*

53. Meteorological Atlas of the British Isles. 5*s.* 6*d.*

54. Hourly Readings from the Self-Recording Instruments at the Seven Observatories under the Meteorological Council, 1882. Parts I. and II., 20*s.* each; Part III., 22*s.* 6*d.*; Part IV., 26*s.*

55. Quarterly Weather Report for 1878. (New Series.) Parts I., II., III., and IV., 6*s.* each. Appendices and Plates. 28*s.*

56. Sunshine Records of the United Kingdom for 1881. 4*s.*

57. Meteorological Observations at Stations of the Second Order for the year 1880. 34*s.* 6*d.*

58. Report of the Meteorological Council for 1882–3. 10½*d.*

59. Charts showing the Surface Temperature of the Atlantic, Indian, and Pacific Oceans. 21*s.*

60. Principles of Forecasting by means of Weather Charts. By the Hon. Ralph Abercromby, F.R.Met.Soc. (Second edition.) 2*s.*

61. A Barometer Manual for the Use of Seamen. (Second edition.) 1*s.* 3*d.*

62. Monthly Weather Reports for 1884. Jan., Feb., March, May—Nov., 1*s.* 6*d.* each. April (with 2 Appendices), 2*s.* 6*d.* Dec., 1*s.* 9*d.*

63. Hourly Readings from the Self-Recording Instruments at the Seven Observatories under the Meteorological Council, 1883. Parts I., II., and III., 21*s.* each; Part IV., 30*s.*

64. Report of the Meteorological Council for 1883–4. 1*s.* 2*d.*

65. Monthly Weather Reports for 1885. Jan. to Dec., 1*s.* 6*d.* each.

66. Meteorological Observations at Stations of the Second Order for the year 1881. 35*s.*

67. Report of the Meteorological Council for 1884–5. 4*s.* 4*d.*

68. Monthly Weather Reports for 1886. Jan. to Dec., 1*s.* 6*d.* each.

69. Meteorological Observations at Stations of the Second Order for the year 1882. 35*s.*

70. Hourly Readings from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1884. Part I., 12*s.*; Part II., 10*s.*; Part III., 10*s.* 6*d.*; Part IV., 15*s.*

71. Synchronous Weather Charts of the North Atlantic and the adjacent Continents. Aug. 1, 1882, to Sept. 3, 1883. Parts I. to IV. (33 sheets each.) 17*s.* each.

72. Report of the Meteorological Council for 1885–86. 8*d.*

73. Meteorological Observations at Stations of the Second Order for the year 1883. 30*s.*

74. Hourly Readings from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1885. Parts I. and II., 11*s.* each; Part III., 10*s.* 6*d.* Part IV., 12*s.*

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* For the years 1874–1880 the Hourly Readings were issued in lithographed from Price 20*s.* per annum.

No. 75. Report of the Meteorological Council for 1886–87. 8*d.*
76. Charts showing the Mean Barometric Pressure over the Atlantic, Indian, and Pacific Oceans. 10*s.* 6*d.* Supplementary Chart, 6*d.*
*77. Monthly Weather Reports for 1887. January to April, 1*s.* 6*d.* each. May to December, in wrapper, 12*s.*
78. Meteorological Observations at Stations of the Second Order for the year 1884. 32*s.*
79. Report of the Meteorological Council for 1887–88. 1*s.*
80. Daily Weather Charts for the period of six weeks ending June 25, 1885, to illustrate the tracks of two cyclones in the Arabian Sea. 10*s.*
81. Hourly Readings from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1886. Parts I., II., and III., 10*s.* 6*d.* each. Part IV., 12*s.* 6*d.*
82. Meteorological Observations at Stations of the Second Order for the year 1885. 31*s.*
83. Meteorological Observations at the Foreign and Colonial Stations of the Royal Engineers and the Army Medical Department. 1852–1886. 23*s.*
84. Report of the Meteorological Council for 1888–89. 5½*d.*
†85. Weekly Weather Report for the year 1888. Vol. V. Second Series. 4*d.* per week. With Appendices and Monthly Supplements, priced separately. Annual subscription, including Supplements and Appendices, post paid, 21*s.* 2*d.*
86. Weekly Weather Report for the year 1889. Vol. VI. Second Series. 6*d.* per week. With Appendices and Monthly Supplements, priced separately. Annual subscription, including Supplements and Appendices, post paid, 30*s.*
87. Weekly Weather Report for the year 1890. Vol. VII. Third Series. (For Price, &c., see No. 86.)
88. Meteorological Observations at Stations of the Second Order for the year 1886. 25*s.*
89. Meteorological Observations made at Sanchez, Samaná Bay, St. Domingo. 1886–88. By the late W. Reid, M.D. 8*s.* 6*d.*
90. Cyclone Tracks in the South Indian Ocean. From information compiled by Dr. Meldrum, C.M.G., F.R.S. 7*s.*
91. Report of the Meteorological Council for 1889–90. 7½*d.*
92. Meteorological Charts of the portion of the Indian Ocean adjacent to Cape Guardafui and Ras Hafún. 6*s.*
93. Harmonic Analysis of Hourly Observations of Air Temperature and of Pressure at British Observatories. 12*s.*
94. Hourly Means of the Readings obtained from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1887. 16*s.*
95. Meteorological Observations at Stations of the Second Order for the year 1887. 24*s.*
96. Weekly Weather Report for the year 1891. Vol. VIII., Third Series. (For Price, &c., see No. 86.)

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* Publication continued after this year as a Supplement to the Weekly Weather Report.

† The publication of the Weekly Weather Report began in February 1878. Annual subscription, 1878–1883, 12*s.* 6*d.*; 1884–1887, 21*s.* 2*d.*

LIST OF PUBLICATIONS—*continued.*

No. 97. Hourly Means of the Readings obtained from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1888. 20*s.*
98. Ten Years Sunshine in the British Isles, 1881–90. 2*s.*
99. Report of the Meteorological Council for 1890–91. 5½*d.*
100. Weekly Weather Report for the year 1892. Vol. IX., Third Series. (For Price, &c., see No. 86.)
101. Meteorological Observations at Stations of the Second Order for the year 1888. 22*s.*
102. Report of the International Meteorological Conference at Munich in 1891. 1*s.* 6*d.*
103. Hourly Means of the Readings obtained from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1889. 15*s.*
104. Report of the Meteorological Council for 1891–92. 6*d.*
105. Hourly Means of the Readings obtained from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1890. 20*s.*
106. Meteorological Charts of the Red Sea. 21*s.*
107. Weekly Weather Report for the year 1893. Vol. X., Third Series. (For Price, &c., see No. 86.)
108. Meteorological Observations at Stations of the Second Order for the year 1889. 34*s.*
109. Report of the Meteorological Council for 1892–93. 8*d.*
110. Meteorological Observations at Stations of the Second Order for the year 1890. 34*s.*
111. Weekly Weather Report for the year 1894. Vol. XI., Third Series. (For Price, &c., see No. 86.)
112. Report of the Meteorological Council for 1893–94. 7½*d.*
113. Hourly Means of the Readings obtained from the Self-recording Instruments at the Five Observatories under the Meteorological Council, 1891. 32*s.* 6*d.*
114. Rainfall Tables of the British Isles for 1881–90. (In the Press.)
115. Report of the International Meteorological Committee. Upsala, 1894. 1*s.*
116. Weekly Weather Report for the year 1895. Vol. XII., Third Series. (For Price, &c., see No. 86.)
117. Meteorological Observations at Stations of the Second Order for the year 1891. 30*s.*
118. Hourly Means of the Readings obtained from the Self-recording Instruments at the Five Observatories under the Meteorological Council, 1892. 21*s.*
119. Report of the Meteorological Council for 1894–95. 8½*d.*
120. Meteorological Observations at Stations of the Second Order for the year 1892. 27*s.*
121. Weekly Weather Report for the year 1896. Vol. XIII. Third Series. (For Price, &c., see No. 86.)
122. Report of the Meteorological Council for 1895–96.
123. Meteorological Charts for the district between the Cape of Good Hope and New Zealand. (In the Press.)
124. Monthly Current Charts for the Indian Ocean, from Information collated and prepared in the Meteorological Office. Published by the Admiralty. 7*s.*

NON-OFFICIAL.

No. 1. Report of an Inquiry into the Connexion between Strong Winds and Barometrical Differences.—By Robert H. Scott, Director of the Office. 6*d.*

2. Report to the Committee of the Meteorological Office on the Meteorology of the North Atlantic.—By Captain H. Toynbee, F.R.A.S., Marine Superintendent. 1*s.*

3. Report to the Committee of the Meteorological Office on the Use of Isobaric Curves.—By Captain H. Toynbee, F.R.A.S., Marine Superintendent. 1*s.*

4. Routes for Steamers from Aden to the Straits of Sunda and back. Translated from a Paper issued by the Royal Meteorological Institute of the Netherlands. 6*d.*

5. On the Winds, &c. of the North Atlantic along the Tracks of Steamers from the Channel to New York. Translated from a Paper issued by the Deutsche Seewarte, Hamburg. 6*d.*

6. Report of the Proceedings of the Meteorological Conference at Leipzig. 1872. 1*s.*

7. Notes on the Form of Cyclones in the Southern Indian Ocean.—By C. Meldrum, M.A., F.R.S. [Out of Print.]

8. Report on Weather Telegraphy and Storm Warnings. Presented to the Meteorological Congress at Vienna. 1873. 6*d.*

9. Report of the Permanent Committee of the First International Meteorological Congress at Vienna for 1874. 1*s.* 6*d.*

10. On the Physical Geography of the part of the Atlantic which lies between 20° N. and 10° S. and extends from 10° to 40° W. A Paper read before the British Association at Bristol, in August 1875.—By Capt. Toynbee, F.R.A.S., F.R.G.S., Marine Superintendent. 1*s.* 6*d.*

11. Report of the Permanent Committee of the First International Congress at Vienna for 1876. With Supplement. 2*s.*

12. Reports to the Permanent Committee of the First International Meteorological Congress at Vienna on Atmospheric Electricity, Maritime Meteorology, and Weather Telegraphy, 1878. 2*s.*

13. Report of the Permanent Committee of the First International Congress at Vienna for 1878. 6*d.*

14. Report of the International Meteorological Committee. Meeting at Berne, 1880. 1*s.*

15. Report of the Second Meeting of the International Meteorological Committee, held at Copenhagen, August 1882. 2*s.* 6*d.*

16. Report of the Third Meeting of the International Meteorological Committee, held at Paris, September 1885. 1*s.*

17. Report of the Fourth Meeting of the International Meteorological Committee, held at Zürich, September 1888. 4*d.*

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(REPORT OF METEOROLOGICAL COUNCIL.)

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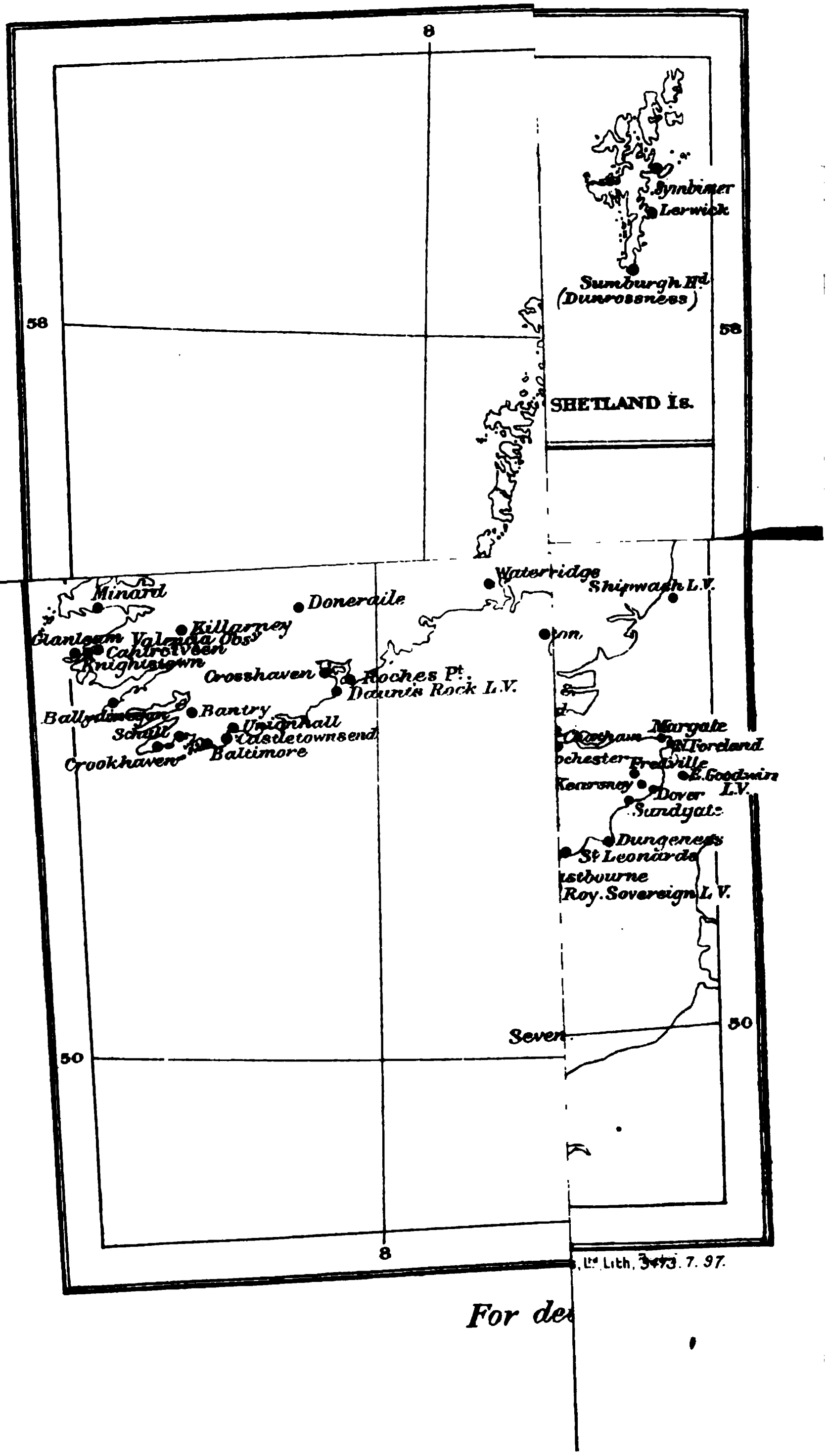

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REPORT

OF THE

METEOROLOGICAL COUNCIL,

For the Year ending 31st of March 1897,

TO THE

PRESIDENT AND COUNCIL

OF THE

ROYAL SOCIETY.

Presented to both Houses of Parliament by Command of Her Majesty.

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THE METEOROLOGICAL COUNCIL,

1896–97.

Lieutenant-General Sir Richard Strachey, R.E., G.C.S.I., LL.D., F.R.S., Chairman.

Mr. Alexander Buchan, M.A., LL.D., F.R.S.E.

Professor George Howard Darwin, M.A., LL.D., D.Sc., F.R.S.

Mr. Francis Galton, M.A., D.C.L., D.Sc., F.R.S.

Mr. Edward J. Stone, M.A., F.R.S.

Rear-Admiral Sir William J. L. Wharton, K.C.B., F.R.S., Hydrographer of the Admiralty.

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REPORT

OF THE

METEOROLOGICAL COUNCIL,

For the Year ending March 31, 1897,

TO THE

PRESIDENT AND COUNCIL

OF THE

ROYAL SOCIETY.

Introductory.

THERE has been no change in the Council during the year, and the executive of the Office is the same as before, Mr. R. H. Scott, M.A., F.R.S., being the secretary, and Nav.-Lieut. C. W. Baillie, R.N., F.R.A.S., the marine superintendent.

In September Mr. Scott attended the International Meteorological Conference, at Paris. There were present 43 delegates representing most of the European States, the United States, Mexico, Canada, and Queensland. The report of the meeting, translated into English, has been published.

The work of the Office may be conveniently considered under four heads, namely:

I. OCEAN METEOROLOGY.
II. WEATHER TELEGRAPHY.
III. CLIMATOLOGY.
IV. MISCELLANEOUS INVESTIGATIONS AND ADMINISTRATION.

PART I.

OCEAN METEOROLOGY.

Collection of information.

Collection of Information.—The Office continues, as in the past, to collect data with respect to the meteorology of the ocean, and to carry out this object complete outfits of meteorological instruments are supplied to officers of merchant ships, who are willing to make observations at sea.

The instruments supplied are:—

One barometer; six thermometers, with a screen; four hydrometers.

Collection of information.

On the return of the ship to England the officer sends in a fair copy of the meteorological log and returns the instruments to the Office or to its agents.

Her Majesty's ships also are supplied with instruments, which, however, differ slightly from those lent to the Mercantile Marine. The Council continue to receive valuable observations from the officers of the Royal Navy.

Agents.

In order to facilitate the supply of instruments to the Mercantile Marine, agencies are established at some of the principal ports.

The following is a list of these agents :—

Cardiff, T. L. Ainsley, Bute Docks.
Dundee, Capt. A. Wood, Navigation School.
Glasgow, Messrs. D. McGregor and Co., Clyde Place.
Greenock, Messrs. D. McGregor and Co., Brymner Street.
Hull, Messrs. Castle and Co., Commercial Road.
Liverpool, J. Gill, Nautical College.
Southampton, Capt. D. Forbes, High Street.

The number of merchant ships supplied with instruments and log books during the year has been 82.

Sets of instruments are kept in working order at the Office in London, and at each agency, for the purpose of instructing observers in the method of observation. Notices to captains as to the supply of instruments are frequently distributed both from the Office and from the several agencies.

Recognition of "excellent" observers.

As a mark of recognition of valuable co-operation, the Council present various publications to observers who return well-kept logs. A list of the publications of the Office is given in Appendix XVI., p. 113.

Appendix I. (p. 21) contains a list of the observers who have, during the past year, contributed logs classed as "excellent." The Council take this opportunity of expressing their best thanks to those who have thus assisted them. Several of these observers have co-operated with the Office for many years. The names which appear in the list for the first time are as follows:—

Observer's Name.	Ship.
Alsop, J.J.	"Brussels."
Beeching, C.	"Ellesmere."
Brewis, Sub-Lieut., C.R.W., R.N.	H.M.S. "Penguin."
Gadd, C.	S.S. "Valetta."
Guy, W.	S.S, "Nova Zembla."
May, Sub-Lieut. F., R.N.	H.M.S. "Dart."
Morton, J.	S.S. "Tartar."
Penfold, Lieut. L.D., R.N.	H.M.S. "Stork."
Simpson, Lieut. and Commr. C. H., R.N.	H.M.S. "Stork."
Weir, W. R.	"Loch Ryan."

They note with regret the death of two of those who have rendered valuable assistance during many years past. The first of these,

Captain David Gray, died in May 1896. He had commanded whaling vessels sailing from Peterhead during 44 years, and enjoyed a very high reputation in that service. He had contributed 20 logs, nearly all "excellent." The second was Lieut. C. E. Pritchard, commanding H.M.S. "Alecto." He was killed in action near Benin in February 1897. He sent in 12 logs, mostly "excellent." Recognition of "excellent" observers.

The meteorological logs received during the year numbered 142, of which 126 were either "excellent" or "very good." Character of logs received.

The Council have continued to receive, through the Ocean Steamship Company of Liverpool, a considerable number of logs, principally relating to voyages to and from the China Seas, viâ Suez.

A list of the meteorological logs from ships, received at the Office during the year is given in Appendix II. (p. 23), this list may be summarised as follows:—

North Atlantic -	- 406	Pacific Ocean, South -	68
South „ -	- 139	Mediterranean -	- 139
Indian Ocean -	- 177	Red Sea -	- 112
Pacific Ocean, North -	75	Arctic Ocean -	- 9

Districts from which observations are obtained.

Various publications of the Office in connexion with ocean meteorology have been either completed during the year, or are in progress. Publications.

Monthly Current Charts for all Oceans.—This work was undertaken with the view of providing the navigator with more definite information as to the average direction and strength of oceanic currents at any period of the year than has hitherto been at his disposal, and it is now approaching completion. The primary part of the labour has consisted in examining the large mass of available material, calculating and plotting on 60 large sheets, the currents recorded in each month during 60 years, and this has occupied a portion of the staff of the Office continuously for eight years past. Current Charts.

The generalisation of this mass of matter, and its production in a form suited to the practical requirements of sailors, has been undertaken by the Hydrographic Department of the Admiralty. In the case of the Indian Ocean it was found that the differences from month to month were sufficient to justify the publication of all the generalised charts, and it is satisfactory to state that their issue, in 1896, has called forth laudatory comments in various countries besides our own.

For the Atlantic, the changes in the currents, as represented in the consecutive monthly charts, are neither so rapid nor so well defined, and it has appeared sufficient to engrave six charts only. As the variations have proved irregular, the months chosen for publication are also irregularly disposed, for while only one chart can be consulted for the months of December, January, and February, others refer to two months, and the month of November alone is represented by a special chart.

Current Charts, Arctic Regions.

For the region lying north of 60° north latitude, the information is very scanty. The currents are weak and variable, and the available records uncertain, for lack of continuous astronomical observations. This portion of the charts is therefore unsatisfactorily bare.

The Atlantic charts are on the point of publication. Considerable progress has been made with the generalisations of the observations recorded in the Pacific Ocean, but the material is here also so insufficient that it is not contemplated to produce more than four charts, which, it is hoped, will be in the hands of the public by the end of the year.

The published charts show the average direction and velocity of the currents, and the maximum and minimum velocity which may be expected.

Southern Ocean.

The Meteorology of the Southern Ocean.—The region referred to lies between the Cape of Good Hope and New Zealand, south of latitude 30° S. As no charts for this area have been previously published, this work will probably be of much value.

The charts are finished, and several have been engraved. They consist of wind, current, and sea temperature charts. As each series contains 12 monthly charts, there will be 36 in all.

The wind charts are partitioned into areas bounded by parallels of latitude 3° apart, and meridians of longitude 10° apart. The prevalent winds are indicated by the same form of wind-rose as that adopted in the Red Sea charts (see the Report for 1892, p. 7). Isobars of mean barometric pressure are drawn on the maps, to show the relationship between mean pressure and prevalent winds. The per-centage of observations, when fog was met with, is noted in the corner of each area. A small chart of the whole area is placed in the corner for the purpose of showing the mean air temperature by means of isotherms, and the occurrence of fog. This method was adopted because it was found that if the isotherms and fog-lines were drawn on the large charts there was danger of confusion.

The sea temperature charts show by shading the areas over which the range of temperature exceeds 20°.

The current charts are copied principally from the charts of the Indian Ocean, already published, but the area has been extended so as to embrace New Zealand.

South Atlantic.

The Meteorology of the South Atlantic and of the West Coast of South America.—The logs in the Office, which relate to this region, have been analysed; the data for those regions which are rarely visited by merchant shipping are supplied chiefly from the logs of the Royal Navy.

Instruments for distant stations.

Collection of Meteorological Observations from Distant Stations.—It has been the custom of the Office to supply instruments to observers in unfrequented parts of the world, when they have reason to believe that the observations will be taken with due care. The observers undertake to send to the Office copies of their observations.

A list of the documents received during the year from such foreign land stations is given in Appendix XII. (p. 82). Instruments for distant stations.

During the past year no new stations of this class have been supplied with instruments on loan. The Foreign Office has, however, purchased three sets of instruments for use in Uganda. Measurements of the rainfall and of the water level of Lake Victoria have already been received from time to time; and copies of these observations have been supplied to the Royal Geographical Society.

Climatological Information for the Admiralty.—Statistics as to the climates of foreign ports are from time to time required by the Admiralty for use in various publications; a good deal of research and of correspondence with foreign meteorological institutes has been required to supply the necessary information. Information supplied for the Admiralty.

Supply and Stock of Instruments.—In Appendix III. (p. 31) a list is given of the meteorological instruments supplied during the year by the Office to the Royal Navy, together with a statement of the stock and of the distribution of the instruments standing on the books to the account of the Admiralty on the 31st March 1897. Stock of instruments belonging to the Office.

Appendix IV. (p. 32) gives similar information with regard to the disposal of the other instruments belonging to the Office, which either remain in store, or have been supplied to the Mercantile Marine, Observatories, and Telegraphic Reporting Stations, &c.

PART II.

Weather Telegraphy and Forecasts.

The forecasts issued by the Office of the probable weather throughout the United Kingdom are based on meteorological observations made at a number of stations, which are in direct telegraphic communication with the Office. General.

The Telegraphic Reporting Stations are those marked with the letter T in the list given in Appendix XI. (p. 76), and the same appendix contains a list of the Foreign Stations which send daily telegrams to the Office.

The only changes in the staff of observers at the home stations are that Miss E. Tolan has replaced Miss M. Tolan at Belmullet, and that Mr. Jenkins has replaced Mr. Cox at the North Foreland.

There has been no serious interruption of telegraphic communication during the year.

The Office continues to receive many inquiries concerning the weather, and a considerable amount of investigation and correspondence is required to obtain the needed information.

Inspection of the Telegraphic Reporting Stations.—The stations in the United Kingdom have been inspected during the year, in England by Messrs. J. S. Harding, F. Gaster, C. Harding, R. Curtis, and J. Curtis; in Scotland by Mr. Buchan; and in Ireland and Wales partly by Mr. Scott and partly by Mr. Gaster. Inspection of the Stations.

Inspection of the Stations.

The reports of the Inspectors are printed in Appendix V. (p. 33), and they show that efficiency has been maintained.

The Council have sustained a great loss by the death of the Rev. W. Clement Ley, who had been their Inspector for England since the year 1878. Mr. Ley had been in failing health for some years, and his last work, "Cloudland," was completed in 1895 by his son, Lieut. Cuthbert Ley, R.E.

Discussion of the reports.

Discussion and Publication of the Information received.—A detailed account of the manner in which the meteorological information received by telegraph is utilised was given in Appendix X. of the Report for 1891, and there has been no change of procedure since that date. The Daily Weather Report contains a synopsis of the weather on the day of issue, based on the telegraphic data; it has appeared regularly during the year.

Distribution of reports.

Certain copies of the Daily Weather Report are distributed without charge, namely, 7 to newspapers, 71 for public exhibition at seaports, 80 to Government offices and public institutions, 61 to correspondents of the Office, and 35 to foreign meteorological institutions. The issue to subscribers amounted to nearly 200 copies.

Weekly Weather Report.

The Weekly Weather Report, and the Monthly Appendices, contain Weekly and Monthly Summaries of the weather. Details as to these publications are contained in Part III., pp. 17, 18, and in Appendix VI., p. 63.

Display of information in front of the Office.

Display at the Meteorological Office in London of the Weather on British Coasts.—At 9.30 a.m. and 3 p.m. every week day the substance of the reports received by telegraph, as to the state of the weather and of the sea at the following stations: Yarmouth, Dungeness, the Needles (Hurst Castle), Scilly, Holyhead, and Valencia Island, is conspicuously displayed on the balcony of the Office, at 63, Victoria Street, S.W. At the same hours charts are suspended in the portico of the street door, which exhibit the latest information. The Council have reason to believe that the public appreciates the opportunity thus afforded them of learning the state of the weather on the coasts.

Forecasts for the Admiralty.

Supply of Forecasts to the Admiralty.—At the request of the Admiralty daily forecasts are regularly supplied to the Commander-in-Chief, at Devonport.

Forecasts.

Weather Forecasts.—Forecasts are made three times a day, namely, at 11 a.m., at 3.30 p.m., and 8.30 p.m. The Forecasts, issued at 11 a.m., are based on the telegrams of observations made at 8 a.m., and refer to a period of 24 hours from noon on the day of issue. These Forecasts are exhibited at several places in London,* and are supplied to newspapers for their later editions. The

---

* Viz., in the City at the Mansion House, Lloyd's Rooms, Messrs. R. & J. Beck's, Cornhill, and Messrs. de la Rue & Co.'s, Bunhill Row; in the West End, in the Libraries of the House of Lords and the House of Commons, at Messrs. Elliott's, St. Martin's Lane; Messrs. Stanford's, Charing Cross; Messrs. Negretti & Zambra's, Regent Street; and Messrs. Pastorelli's, New Bond Street; and at the Office, 63, Victoria Street.

Forecasts issued at 3 30 p.m. are of especial value in relation to storm warnings. They are also of service in the special series of Hay Harvest Forecasts referred to on p. 12. The Forecasts at 8.30 p.m. are prepared for the next morning's newspapers. Each of the three Forecasts has its special applicability, and all of them are available to the public on inquiry at the Office either by letter, by telegram, or in person. Forecasts.

The inquiries received by telegram through the Post Office for special forecasts amounted during the year to 98, and the personal applications to 69. The rules of the Office relating to such inquiries are stated in Appendix VI., p. 67. Inquiries at the Office.

A comparison for the year of the Forecasts for the United Kingdom issued at 8.30 p.m. with the subsequent weather actually experienced is given in detail in Appendix VII. p. 68. Results of Forecasts.

The complete success, partial success, partial failure, and complete failure of the forecast is estimated according to definite rules which are designed to eliminate bias as far as possible.

It will here suffice to state that partial success means that the Forecast was correct at more than half the places of observation situated in the district in question, and a similar interpretation is to be applied to the term partial in the case of the failures.

The detailed comparison of the Forecasts with actuality may be summarised as follows :—

SUMMARY of RESULTS of 8.30 p.m. FORECASTS, 1896-97.

Districts.	Per-centages.				
	Complete Success.	Partial Success.	Partial Failure.	Complete Failure.	Sum of Successes complete and Partial.
SCOTLAND, N. - -	55	28	12	5	83
„ E. -	50	32	12	6	82
ENGLAND, N.E. - -	56	25	13	6	81
„ E. - -	58	26	12	4	84
MIDLAND COUNTIES	56	28	12	4	84
ENGLAND, S. - -	60	27	11	2	87
SCOTLAND, W. - -	47	28	18	7	75
ENGLAND, N.W. -	55	24	14	7	79
„ S.W. -	57	26	11	6	83
IRELAND, N. - -	52	26	14	8	78
„ S - -	49	28	16	7	77
Summary - -	54	27	13	6	81

In order to test the success of the Forecasts of the year in comparison with those of previous ones, the following table has been drawn up. It shows for each year of the decade 1887–96 the per-centages of complete and partial success of the Forecast issued at

Results of Forecasts.

8.30 p.m. It will be noticed that the highest degree of complete success was obtained in 1893.

PER-CENTAGES of SUCCESS in the FORECASTS for the whole of the BRITISH ISLES.

Year.	Complete Success.	Partial Success.	Sum of Successes complete and Partial.
1887 - -	52	32	84
1888 - -	51	31	82
1889 - -	49	32	81
1890 - -	50	32	82
1891 - -	50	30	80
1892 - -	46	33	79
1893 - -	59	25	84
1894 - -	56	27	83
1895 - -	55	25	80
1896 - -	54	27	81
Average - -	52·2	29·4	81·6

Hay Harvest Forecasts.

Hay Harvest Forecasts.—As in previous years the Council has, during the hay harvest, sent Daily Forecasts, without charge, to certain observers selected by the Royal Agricultural Society, the Royal Dublin Society, and the Highland and Agricultural Society. The Council makes it a condition for the supply of these forecasts, that the information shall be disseminated by the recipients as widely as possible, and that a record of the weather actually experienced shall be sent weekly to the Office. No application for the supply of these Forecasts was received from the Board of Agriculture in 1896.

LIST of RECIPIENTS of the HAY HARVEST FORECASTS in 1896.

Districts.	Recipients.	Address.
0. SCOTLAND, N.	Rev. Dr. Joass -	Golspie.
	Major Smith - -	Munlochy, Inverness.
1. SCOTLAND, E.	T. Wilson - -	Glamis Castle, by Forfar.
	C. Pirrie - -	Rothiemay, Huntly.
	T. Bett - -	Dalnaline, Aberfeldy.
2. ENGLAND, N.E.	Sir J. Wilson - -	Chillingham Barns, Belford, Northumberland.
	J. Smith, F.R.H.S. -	The Ferneries, Ulceby.
3. ENGLAND, E.	W. Birkbeck - -	High House, Thorpe, Norwich.
	Sir J. B. Lawes, Bt., and Sir J. H. Gilbert, Ph.D.	Rothamsted, Harpenden.
4. MIDLAND COUNTIES	Royal Agricultural College.	Cirencester.
	Major Fosbery -	Warwick.
	T. H. Thursfield -	Barrow, Broseley, Salop.
	E. E. Harcourt-Vernon	Grove Hall, East Retford.
5. ENGLAND, S.	The South - Eastern Agricultural College.	Wye, near Ashford, Kent.
	C. Whitehead - -	Barming House, Maidstone.
	E. P. Squarey - -	The Moot, Downton, Wilts.
	M. J. Sutton - -	Kidmore Grange, Caversham.

Districts.	Recipients.	Address.
6. Scotland, W.	W. Calder	Castle Hill, Dalreoch, Dumbarton.
	Sir M. J. Stewart, Bt., M.P.	Ardwell, Stranraer.
	J. Forbes	Eallabus House, Islay.
7. England, N.W.	Lord Egerton of Tatton	Tatton Park, Knutsford.
	R. Metcalfe, M D.	Leyburn, Yorkshire.
8. England, S.W.	The Earl of Ducie	Tortworth, Gloucestershire.
	T. Dyke	Long Ashton, Clifton, Bristol.
	R. Neville Grenville	Butleigh Court, Glastonbury.
9. Ireland, N.	E. F. Farrell	Moynalty, Co. Meath.
	J. M. Wilson, J.P.	Currygrane, Edgeworthstown.
10. Ireland, S.	D. A. Milward	Lavistown, Kilkenny.
	W. Talbot Crosbie, D.L.	Ardfert Abbey, Tralee, Co. Kerry.

Hay Harvest Forecasts.

The telegrams were sent daily for the period of about five weeks, commencing in some districts on June 1st. In certain cases, by special request, they were continued for a longer period. There were besides four who subscribed for the Hay Harvest Forecasts.

An estimate of the degree of success of the Forecasts was furnished by the recipients themselves. The following table, compiled from these estimates, contains a summary of the independent judgment of those to whom the telegrams were sent.

Summary of Results.—Hay Harvest Forecasts, 1896.

Districts.	Names of Stations.	Per-centages.				Sum of all Successes Complete and Partial.
		Complete Success.	Partial Success.	Partial Failure.	Complete Failure.	
Scotland, N.	Munlochy and Golspie	59	26	14	1	85
„ E.	Aberfeldy, Glamis, and Rothiemay	50	29	16	5	79
England, N.E.	Belford and Ulceby	48	35	14	3	83
„ E.	Rothamsted and Thorpe	63	23	12	2	86
Midland Counties	Cirencester, East Retford, Warwick, Broseley.	64	31	5	—	95
England, S.	Maidstone, Downton, Caversham, and Wye.	68	28	4	—	96
Scotland, W.	Ardwell, Islay, and Dumbarton	68	22	9	1	90
England, N.W.	Leyburn and Knutsford	62	29	9	—	91
„ S.W.	Tortworth, Clifton, and Glastonbury	55	38	6	1	93
Ireland, N.	Moynalty and Edgeworthstown	58	23	17	2	81
„ S.	Tralee and Kilkenny	50	40	7	3	90
	Mean for all districts	59	29	10	2	88

These figures show that 88 per cent. of the Forecasts were useful; the corresponding per-centage in 1895 was 89. Several of the recipients expressed in writing their satisfaction with the

accuracy of the Forecasts, and Mr. M. J. Sutton, of Caversham near Reading, added the remark that the messages "were greatly appreciated by his neighbours."

Storm Warnings.

Storm Warnings for the Coasts of the United Kingdom.—Warnings of coming storms are despatched by telegraph to certain stations on the coast. These stations are supplied with signals which are hoisted as a warning to mariners of an expected storm. The signals are defined in Circular 717 of the Board of Trade, issued in February 1874.

A list of the stations is given in Appendix VIII., p. 69. At the end of March 1897, there were 215, of which 117 are in England and Wales, 63 in Scotland, 28 in Ireland, 4 in the Isle of Man, and 3 in the Channel Islands.

A comparison has been made in the Office between the warnings issued during the year and the subsequent weather actually experienced. The method of comparison is explained in Appendix. VI., p. 67, and the results are exhibited in the following table:—

COMPARISON between the WARNINGS and the subsequent WEATHER in 1896.

Coasts.	Total No. of Orders to hoist and repetitions.	Warnings justified by Winds. Forces 6 and 7.	Warnings not justified by subsequent Weather.	Warnings late. Force 8 reached at two Stations before issue.	Warnings partially late. Force 8 reached at one Station before issue.	Warnings late owing to Telegraphic Error.	Storms for which no Warning was issued.
Scotland, N.E. -	46	32	8	4	—	2	—	Dec. 25.
„ E. -	36	13	17	6	—	—	—	——
„ N.W. -	45	29	12	[illegible]	—	—	—	Dec. 25.
„ W. -	40	25	10	5	—	—	—	——
Ireland, S.W. -	36	25	7	1	—	3	—	Mar. 16.
„ N.W. -	43	35	6	1	—	1	—	——
Irish Sea - -	42	31	9	—	—	2	—	May 20.
St. George's Channel	31	[illegible]	10	—	—	—	—	Mar. 16.
Bristol Channel -	30	25	4	—	—	1	—	Mar. 16.
England, S.W. -	31	24	6	1	—	—	—	——
„ S. -	20	15	3	1	—	—	1	——
„ S.E. -	21	12	7	2	—	—	—	——
„ E. -	21	15	6	—	—	—	—	Nov. 6.
„ N.E. -	25	14	6	2	—	3	—	——
Totals - -	467	316	111	26	—	13	1	
Per-centages -	—	67·7	23·8	5·6	—	2·7	0·2	

NOTES as to GALES EXPERIENCED in 1896, but for which no WARNING was issued.

March 16th.—A south-westerley gale. Ireland S.W., St. George's Channel, and Bristol Channel. Our N. and N.W. coasts were all warned on the morning of 15th but a new deep depression advanced rapidly to our W. coasts on the night of the 15th–16th, giving no definite indication of its approach at 6 p.m. 15th.

May 20th.—Irish Sea. A north-westerly gale. All the Scotch coasts were warned at 3 p.m. on 20th, but the gale extended farther to the southward along our north-western coasts than was anticipated. Storm Warnings.

November 8th.—A strong northerly gale on the E. and S.E. coasts of England. This was caused by a sudden deepening of a small depression which advanced over England from the north-westward. There was no indication of danger at 6 p.m. on the 7th.

December 25th.—A south-south-westerly gale in Scotland N.E. and N.W. This gale was not indicated by the observations at 8 a.m. on the 25th, and at 6 p.m. it was too late for warnings to be issued. At 2 p.m. the Office was not open.

The following table contains a statement of the amount of success of storm warnings in the decade 1887–96. It will be seen that the warnings were very successful although slightly less so than in 1894, while the per-centage of warnings not justified by subsequent weather was the lowest on record, being only 2·9. Comparison of results for 1896 with previous years.

Years.	Total No. of Warnings issued.	Warnings justified by subsequent Gales.	Warnings justified by subsequent strong Winds.	Total Warnings justified.	Warnings not justified by subsequent Weather.
		p.c.	p.c.	p.c.	p.c.
1887	472	55·5	26·1	81·6	16·4
1888	539	55·8	28·6	83·9	14·3
1889	373	47·7	33·5	81·2	16·9
1890	525	61·0	25·5	86·5	9·3
1891	522	62·3	24·5	86·8	7·5
1892	488	59·4	31·2	90·6	6·8
1893	480	60·8	28·6	89·4	7·1
1894	502	68·5	23·5	92·0	6·0
1895	523	63·3	26·4	89·7	8·0
1896	467	67·7	23·8	91·5	2·9

Fishery Barometers.—Barometers have for many years been lent by the Office to fishing villages and other places on the coast, for the benefit of sailors and fishermen. A list of the stations thus provided is given in Appendix IX., p. 71. There are 214 stations of this kind, of which 67 are in England, 7 in Wales, 62 in Ireland, 73 in Scotland, 4 in the Isle of Man, and 1 in Jersey.

PART III.

Climatology.

I.—British Isles.

Meteorological observations of the highest refinement and completeness entail considerable expense, and the service of highly trained observers. It has, therefore, been the policy of the Office Climatology.

Climatology.

to subsidise and to maintain an intimate relationship with a small number of observatories of the highest class. The data derived from these stations are used in investigations, which require minute and continuous knowledge of the several meteorological elements. These stations are, however, too widely scattered to afford a good general representation of the winds, barometric pressure and sunshine, and it has accordingly been found necessary to supplement them by certain other "anemographic," "barographic," and "sunshine" stations.

The distribution required for representing the climate of these islands differs from that needed for the immediate forecasting of the weather. For the latter purpose, therefore, the Office is in communication with the "Telegraphic Reporting Stations" referred to in Part II.

The climate of Great Britain and Ireland is very diverse and fortunately there are throughout the country many stations where good meteorological observations are made by volunteer observers. Such of these stations as furnish the Office with observations are classified as stations of the second and third order.

This classification does not connote any defect of quality in the observations, but depends merely on the amount of information furnished to the Office. Thus the Observatory at Bidston, Liverpool, and the Radcliffe Observatory at Oxford are ranked as of the second order, although their equipment and the quality of work is of the first order.

A list of all the stations is given in Appendix XI. (p. 76). Certain letters are attached to each station, which indicate the nature of the information supplied to the Office. From what has been just stated it will have appeared that the observatories may be classified in seven categories; but an examination of the list in Appendix XI. will show that the categories to a certain extent over-lap, so that the same station may occur in two of them.

The seven categories are as follows:—

Observatories of first order.

1. *Observatories of the First Order*, subsidised by the Office, and furnishing continuous photographic records of the barometer and thermometer, and continuous records of rainfall, wind, and sunshine with frequent eye observations of the weather and of the kind and amount of cloud.

Anemographic Stations.

2. *Anemographic Stations* which furnish continuous records of the direction and force of the wind. These records are often of use in affording evidence in courts of law; they are regularly employed in checking the accuracy of the storm warnings.

Barographic Stations.

3. *Barographic Stations* which furnish continuous records of the aneroid barometer.

Sunshine Stations.

4. *Sunshine Stations* which furnish continuous records of bright sunshine. At most of these the record is made by the Campbell-Stokes instrument, of which an account was given in the Annual Report of the Office for 1879 (p. 32.)

The stations of the categories 2, 3, and 4 are of especial service in matters which relate to the weather as distinguished from climate.

5. *Telegraphic Reporting Stations* which furnish the data for the forecasts and storm warnings, as explained in Part II. Telegraphic Reporting Stations.

6. *Stations of the Second Order* which furnish complete climatological data. The observations are taken twice a day, and the observers are volunteers. Second Order Stations.

7. *Stations of the Third Order* which resemble those of the second order, except that the information sent to the Office is less full. Third Order Stations.

An account of the methods employed by the Office in dealing with all these records is given in Appendix X., p. 72.

The stations may be summarised as follows :—

Class.	Description.	Number.
1	Observatories - - - -	7
2	Anemographic stations - - -	15
3	Barographic (Aneroid) stations -	15
4	Sunshine stations - - -	62
5	Telegraphic stations - - -	30
6	Second Order stations - - -	79
7	Third Order stations - - -	61

Inspection of the Stations.—The stations classified under the heads 1–5 are visited regularly by the Inspectors of the Office. The stations of Class 7 are inspected as opportunity offers. Some of the stations of Class 6 belong to the Royal Meteorological Society, and are visited by an Inspector appointed by that Society. In accordance with the recommendation of the Treasury Committee (1877) a contribution towards the cost of these inspections is made by the Office. The rest of the stations of Class 6 are visited, in most cases annually, by the Inspectors of the Office. The inspection of the seven principal observatories and of some of the anemographic stations was carried out by Messrs. T. W. Baker and E. G. Constable, of the Kew Observatory. Inspection of Stations.

Extracts from the reports of the Inspectors are given in Appendix V., p. 33.

Information supplied to the General Register Office, Dublin.—Reports from the Irish stations have been supplied regularly to the Registrar General for Ireland, for his Weekly and Quarterly Returns. Reports supplied to Registrar General for Ireland.

Publications.

Details as to the Weekly Weather Report, which is prepared in the Telegraphic Branch of the Office, are given in Appendix VI. It supplies, by its synchronous daily charts and Monthly Summaries, an instructive view of the meteorological changes, day by day, over the greater part of Europe. Weekly.

Appendix I. of the Weekly Weather Report for 1896 gives a summary for each quarter, and for the whole year, of the Rainfall and Temperature in each district, for the 31 years, 1866–1896, and also the Monthly and Progressive values of "Accumulated Heat," Rainfall, and Bright Sunshine for all the districts in each month of 1896.

Publications.

Weekly.

Appendix II. to the same Report gives in continuation of the similar Appendices for 1895, the Weekly and Progressive values of the same elements during the year 1896.

Appendices III. and IV. give similar values for each week for the whole period 1881–1895, and for the three lustra therein contained.

The Preface also contains Tables of the mean values of Temperature, Rain, and Bright Sunshine for the longest period available in each case.

Hourly Means of Meteorological Observations.

Hourly Means of Meteorological Observations.—The Volume of Hourly Means for five of the first-class observatories for 1893 has appeared and that for 1894 is in the press. These volumes give hourly means, or totals, of pressure, temperature, wind force, rain and sunshine for periods of five days, and for the months and whole year.

The Council have in view the computation of the harmonic components of the diurnal curves of pressure and temperature from these values.

Publication of observations.

Observations at Stations of the Second Order.—The volumes for 1892 and 1893 are now issued, and that for 1894 is far advanced.

The form of this publication remains unchanged. It comprises, first, the actual observations at 9 a.m. and 9 p.m. at 21 stations, printed on a modification of the form A., adopted for International use by the Meteorological Congress at Rome, 1879—and, secondly, the Monthly Means and Summaries at stations printed in the form B. also adopted by the same Congress, together with an Annual Summary for all stations, and a Return of Bright Sunshine.

The stations published on form A. for 1893 differ from those for 1892 by the substitution of Plymouth for Babbacombe, where the observations have been discontinued.

Babbacombe now disappears also from form B. list, and Seaham Harbour, and Sheffield (Weston Park Museum), appear there for the first time.

The volume for 1894 is now passing through the press. It differs from the volume for 1893, in that Carmarthen disappears from the form A. list, and is replaced by St. David's. Carmarthen also disappears from the form B. list, while Ben Nevis, Heysham Hall (Morecambe Bay), and Bramley, Surrey, are added to it.

II.—Foreign and Colonial Stations.

Foreign and Colonial Stations.

Observations made at various Foreign and Colonial Stations are frequently received at the Meteorological Office.

During the year 46 such returns have come in, and a list of them is contained in Appendix XII., p. 82.

In most cases the observations were taken twice a day, and the results are dealt with in the same way as those from Stations of the Second Order in Class 6 above. Continuous records of bright sunshine were received from Georgetown (Demerara) and from Trinidad.

The meteorological results given in the Cyprus Blue Book, refer to six stations in the island. The tables continue to be constructed in the Office. Foreign and Colonial Stations.

Returns from foreign and colonial stations are published from time to time. Observations from Cape Juby on the N.W. coast of Africa, from Georgetown (Demerara), and from Malta, are now being prepared for publication.

PART IV.

Miscellaneous Investigations and Administration.

Anemometer Experiments.—Mr. Dines' pressure-tube anemometers at Holyhead and Scilly, mentioned in the last Report, have already yielded interesting results. Anemometer Experiments.

The pressure-tube anemometer which formerly stood on the roof of the Meteorological Office has been removed, and is now erected on the roof of the Kew Observatory.

The pressure-plate anemometer, referred to in the last Report and intended for use at Holyhead in conjunction with the bridled and pressure-tube anemometer, is finished and will be put up shortly. It is designed to register the maximum pressure during gales, and will be put in action when there is reason to expect violent squalls.

Measurement of Earth Temperature.—Since mercury thermometers are not well adapted for measurement of earth temperatures, experiments have been carried on at Kew Observatory with Callendar and Griffith's electrical resistance thermometers. The instrument is admirably adapted for the objects in view, but the cost is so high that observations can be undertaken at a few stations only. A considerable degree of skill is required for the manipulation of the most refined form of these thermometers, but the Council have reason to hope that a simpler and sufficiently accurate method of taking the readings may be devised, and that the instrument may then become more generally available. Earth Temperatures.

Rainfall Means for the British Islands.—Parts I., II., and III. have been printed. The last part is followed by an alphabetical index of all the stations for which data exist, either in the present or the previous publication. The work will be illustrated by maps, which give the average annual rainfall at each station for the decade 1881–90, and also show the limits of the principal river basins. Rain Tables for the British Isles.

The hourly results of the continuous rain records at the seven original observatories have now been calculated for the twenty years 1871–90, and will be published in the course of the coming year.

The Library, &c.

The library contains standard works and serial publications on Meteorology and the allied Sciences. It consists at present of Library.

Library. about 14,000 volumes and pamphlets, there are besides many charts and MS. records of observations. The library at the Office is accessible to students engaged in meteorological investigations.

The catalogue is arranged both under authors' names and subjects, and each work is now entered on a card as soon as received.

Appendix XIII., p. 85, contains a list of the additions to the library during the year.

Appendix XV., p. 108, gives a list of the important contributions to meteorology which have appeared in the various reports issued by the Office since 1866.

Appendix XVI., p. 113, gives a catalogue of publications issuing from the Office.

Expenditure.

Financial. Appendix XIV., p. 107, shows the receipts and payments during the year ending 31st March 1897. The amount voted by Parliament was 15,300*l.*, as in the previous year, and the miscellaneous receipts amounted to 931*l.* 8*s.* 6*d.*

The following abstract of expenditure shows the true charge against the Parliamentary grant of this and the preceding year, together with the increase or decrease in 1896–97, as compared with the previous year :—

Net Expenditure.	1895–96.	1896–97.	Increase.	Decrease.
General Administration:	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Payment of Council -	991 5 0	991 5 0	—	—
Secretary - -	800 0 0	800 0 0	—	—
Office - - -	904 10 9	945 8 0	40 17 3	—
Rent, fuel, and lighting -	703 15 6	714 12 11	10 17 5	—
Alterations to premises and contingencies -	340 13 5	273 15 8	—	66 17 9
Expenses incidental to International Meteorological Congress -	4 18 0	23 10 8	18 2 8	—
Pensions - -	144 0 0	144 0 0	—	—
Special Researches -	836 9 0	752 3 5	—	84 5 7
Land Meteorology -	3,662 15 11	3,572 7 6	—	90 8 5
Weather Information -	3,785 9 9	3,775 9 1	—	10 0 8
Inspections - -	519 4 0	445 17 0	—	73 7 0
Ocean Meteorology -	2,493 11 11	2,396 17 11	—	96 14 0
Total - - £	15,186 13 3	14,835 7 2	70 7 4	421 13 5

In the year 1896–97 the sum of 1,725*l.* 8*s.* 7*d.* was paid to the Post Office on account of inland and foreign telegrams, allowances to telegraph clerks, rental of private wires, &c.

(Signed) R. Strachey,
Chairman.

30th June 1897.

APPENDIX.

APPENDIX I.

List of Captains and Officers who have sent in Logs classed as "Excellent" during the year ending March 31, 1897. Figures are attached to the name of each observer to show the number of "Excellent" logs which he has supplied during the whole time of his co-operation with the Office.

Name of Captain or Officer.	Number of "Excellent" Logs.	Ship.
Alford, F. - - -	4	S S. "Monarch."
Alsop, J. J. - - -	1	Barque "Brussels."
Andersen, O. E. - -	16	S.S. "Longhirst."
Angus, T. S. - - -	14	S.S. "Ballaarat."
Atkinson, G. W. - -	16	S.S. "Valetta."
Balfour, Comr. A. F., R.N. -	27	H.M.S. "Penguin."
Beeching, C. - - -	1	Barque "Ellesmere."
Bolton, S. H. - - -	22	S.S. "El Dorado."
Brewis, Sub-Lieut. C. R. W., R.N.	2	H.M.S. "Penguin."
Bright, H. - - -	11	Barque "Beltana."
Chesshire, G. H. - -	6	S.S. "Aldgate."
Docherty, H. - - -	7	Barque "Tinto Hill."
Dupen, P. P. - - -	4	S.S. "Cabenda."
England, T. - - -	18	Barque "Glen Grant."
Field, A. M., R.N. - -	17	H.M.S. "Penguin."
Free, T., R.N.R. - - -	4	S.S. "Port Chalmers."
Gadd, C. - - -	1	S.S. "Valetta."
Gibson, J. H. - - -	4	S.S. "Wydale."
Glossop, Lieut H. A. P., R.N.	6	H.M.S. "Rambler."
Goodrham, H. - - -	4	S.S. "Woolloomooloo."
Gubbins, Lieut. G. W., R.N. -	4	H.M.S. "Penguin."
Guy, W. - - -	1	S.S. "Nova Zembla."
Howard, Lieut. and Comr. W. V. S., R.N.	5	H.M.S. "Dart."
Jamieson, D. E. - -	3	S.S. "Port Chalmers."
Lobb, Staff-Comr. F. J., R.N. -	2	L.H. Tender "Richmond."
May, Sub.-Lieut. F., R.N. -	1	H.M.S. "Dart."
Millican, J. W. - -	13	S.S. "Loughrigg Holme."
Milne, W. F. - - -	12	S.S. "Eclipse."
Milner, W. H. - - -	24	S.S. "Pará."
Mitchell, J. - - -	5	Barque "Cape York."
Moignard, P. - - -	9	Ship "Garsdale."

Name of Captain or Officer.	Number of "Excellent" Logs.	Ship.
Morton, J. - - -	1	S.S. "Tartar."
Mullan, F. C., F.R.G.S. -	2	S.S. "Romney."
Murdoch, P. - - -	17	Ship "Sierra Lucena."
Murray, A. - - -	4	Barque "Perseverance."
Nedden, H. zur - -	6	S.S. "Madeline."
Norman, F. - - -	9	Ship "Milton Stuart."
Peebles, R. - - -	20	S.S. "Breconshire."
Penfold, Lieut. L. D., R.N. -	3	H.M.S. "Stork."
Price, J. H. - -	10	Ship "Othello."
Randall, W. - - -	16	Ship "Laomene."
Renaut, W. - - -	2	Ship "Timaru."
Richards, Comr. G. E., R.N. -	6	H.M.S. "Rambler."
Sargent, A. H. - -	10	Ship "Pleione."
Simpson, Alexander - -	23	S.S. "Thermopylæ."
—— Alexander - -	27	S.S. "Traveller."
Simpson, Lieut. and Comr. C. H., R.N.	3	H.M.S. "Stork."
Thomas, H. G., R.N.R. -	5	S.S. "Yarrawonga."
Trott, S., F.R.Met.Soc. -	33	S.S. "Minia."
Tuke, F. M. - - -	4	S.S. "Ormuz."
Weir, W. R. - - -	1	Ship "Loch Ryan."
Worcester, W. D. G., R.N.R. -	6	S.S. "Victoria."

APPENDIX II.

List of Meteorological Logs and Documents received from Ships.

Captain's Name.	Ship.	Voyage.	Year.	Officers who have assisted in keeping the Meteorological Register.
Alford, F.	H.M.T.S. Monarch	Off coasts of British Isles	1895–96	F. Bourdeaux and other officers.
Alsop, John J.	Barque Brussels	Brisbane	1896–97	——
Andersen, O. E.	S.S. Longhirst	Pernambuco and New York	1895–96	——
„ „	„	East Coast of North America	1896	1st and 2nd officers.
Angus, T. S.	S.S. Ballaarat	Sydney, viâ Suez	1896	E. Williamson, 4th Officer, E. Hurleston, 5th officer, and W. J. Hinks, 6th Officer.
„ „	„	„ „	1896	T. W. Bennett, 4th Officer, E. Williamson, 5th Officer, and S. S. Higgins, 6th Officer.
„ „	„	„ „	1896–97	E. Williamson, 4th Officer, W. A. Faulkener, 5th Officer, and H. J. Feakes, 6th Officer.
Atkinson, G. W., F.R.Met.Soc.	S.S. Valetta	Sydney, viâ Suez	1896	Messrs. Tyers, Baker, and Hay.
„ „	„	„ „	1896	J. Bennett, F. Hutchinson, and W. Hallam.
„ W. T.	S.S. Benedick	China, India, and Mauritius, viâ Suez	1895–97	S. Williams, C.O., and C. Owen, 2nd Officer.
Aubin, F. P.	S.S. Port Melbourne	New Caledonia, viâ Cape Town	1896	A. E. Sorosen, 1st Mate. F. A. Peake, 2nd Mate.
„ „	„ „	Australia, viâ Cape, and home, viâ Suez	1896–97	A. , R.N.R., 3rd Mate.
Bain, David	Ship Orontes	Melbourne	1895–96	J. C. Kerr, 1st Mate, H. P. Joseph, 2nd Mate.
Balfour, Com. A. F., R.N.	H.M.S. Penguin	At Australian station	1894–96	Lieut. G. W. Gubbins, R.N.
Barker, D. Wilson, R.N.R.	School Ship Worcester	Off Greenhithe	1896	The Cadets.
Barr, I.	S.S. Orestes	China, viâ Suez	1892	——
Barr, John	Ship Falls of Foyers	Calcutta and New York	1895–96	Fred. Title, Chief Officer, and J. W. Read.
Bartlett, T.	S.S. Achilles	China, viâ Suez	1892	——
Barwise, Jeremiah	S.S. Telemachus	Batavia, viâ Suez	1894	——
Beeching, Charles	Barque Ellesmere	San Francisco	1895–96	——

List of Meteorological Logs and Documents received from Ships—*continued.*

Captain's Name.	Ship.	Voyage.	Year.	Officers who have assisted in keeping the Meteorological Register.
Bell, C. H. - -	S.S. Laconia - -	Alexandria - - - - -	1896	Henry Evans, 2nd Officer.
„ „ - -	„ - -	Mediterranean Ports - - - -	1896	„ „
„ „ - -	„ - -	„ - - -	1896–97	„ „
Blair, James - -	Barque Loch Rannoch	Adelaide - - - - -	1895–96	W. Holms-Paisley, T. McClements, 1st Mate, and D. Campbell, 2nd Mate.
Bolton, S. H. - -	S.S. El Dorado -	Spanish Ports, &c. - - - -	1895–96	G. R. Anstice, Chief Officer.
„ „ - -	„ - -	Continental Ports - - - -	1896	„ „
„ „ - -	„ - -	„ - - - -	1897	———
Brander, J. - -	R.M.S. Thames - -	River Plate - - - - -	1896	———
„ - -	„ -	„ - - - - -	1896	———
Bright, H. - -	Barque Beltana - -	Adelaide - - - - -	1896–97	J. W. Budgen and W. Mulley.
Bulkeley, T. D. -	S.S. Atrato - -	West Indies - - - -	1896-97	H. J. Bennett, 3rd Officer, F. J. Sweeting, 4th Officer, and F. S. Little, 5th Officer.
Burton, G. - -	S.S. Rangatira - -	Auckland, viâ Cape Good Hope, and home, viâ Cape Horn.	1895–96	———
Burton, Thomas - -	Ship Crusader - -	New Zealand - - - -	1895–96	———
Cattrall, C. - -	Ship Loch Lomond -	Melbourne - - - - -	1895–96	———
Chesshire, G. H. - -	S.S. Aldgate - -	New Orleans and Monte Video - -	1895–96	C. Louis, 1st Officer, C. Oldham, 2nd Officer, and V. Holyoake, 3rd Officer.
Combe, Lieut. and Comr. J. W., R.N.	H.M.S. Waterwitch -	West Coast of Africa, Simons Bay, Hobart, Sydney, and Fiji.	1894–95	Sub-Lieut. W. T. P. Wilson, R.N.
Davies, J. A. - -	S.S. Oanfa - -	China and Japan, viâ Suez - -	1896	F. Skeggs.
„ „ -	„ - -	China, viâ Suez - - - -	1896–97	R. J. Woodget.
Davis, G. W. - -	S.S. Alberta - -	New York, Cape Town, and New Orleans -	1896	Harold Davie, Chief Officer; assisted by T. Younghusband, 2nd Officer.
Day, R. - -	S.S. Deucalion - -	Batavia, viâ Suez - - - -	1894	———
De Horne, M.	S.S. Carthage - -	Bombay, viâ Suez - - - - -	1896	W. R. Calder, and C. F. Winthrop.
„ „ -	„ - -	„ „ - - - -	1896	„ 5th Officer.

Dickens, E. G.	S.S. Diomed	China, viâ Suez	1893	—
Dickinson, L. R.	S.S. "Atrato"	West Indies	1896	H. J. Bennett, 3rd Officer, F. J. Sweeting, 4th Officer, and F. S. Little, 5th Officer.
" "	"	"	1896	H. G. Roberts, 4th Officer, and H. E. F. Paterson.
Docherty, Hugh	Barque Tinto Hill	Rio Janeiro, Batavia, and Boston	1895–96	E. A. Dent, 2nd Mate.
Dupen, P. P.	S.S. Cabenda	West Coast of Africa	1896	C. C. Boase, 2nd Officer.
" "	"	" "	1896	"
" "	"	" "	1896	J. Lennox.
Edwards, John T.	Barque Dumfrieshire	To Sydney	1895	A. W. Tranent, 1st Mate, and W. H. Simpson, 2nd Mate.
England, Thomas	Barque Glen Grant	Apalachicola	1895–96	—
Field, A. M., R.N.	H.M.S. Penguin	At Ellice Islands and Fiji	1896	Sub.-Lieut. C. R. W. Brewis, R.N.
" "	"	South Pacific	1896	" "
Forsdick, J. P.	Ship Waitangi	New Zealand	1895–96	S. Thomas, Chief Officer, and S. Muir, 2nd Officer.
Forth, J. W.	S.S. Galileo	New York	1896	A. E. Booth, 2nd Officer.
Free, Thomas, R.N.R.	S.S. Port Chalmers	Melbourne, viâ Suez	1895–96	Walter Plugge, 1st Officer, Frederick Tunbridge, 2nd Officer, and E. N. Lewer, 3rd Officer.
Gadd, Chas.	S.S. Valetta	Sydney, viâ Suez	1896–97	J. de C. Gibbons, 6th Officer, assisted by A. P. Parmeter, 4th Officer, and W. W. Hallam, 5th Officer.
Gibson, J. H.	S.S. Wydale	New Orleans, and Newport News	1895–96	T. Sutton and J. Donovan.
" "	"	New Orleans	1896	—
Goodrham, H.	S.S. Woolloomooloo	Adelaide, viâ Cape Good Hope, and home, viâ Suez.	1896	A. Rogers, Chief Officer, H. Reay, 2nd Officer, P. Woore, 3rd Officer, and T. Tucker, 4th Officer.
" "	"	" " " " "	1896	Alf. Rogers, H. Reay, E. Tucker, and C. Trumper.

List of Meteorological Logs and Documents received from Ships—*continued.*

Captain's Name.	Ship.	Voyage.	Year.	Officers who have assisted in keeping the Meteorological Register.
Goodwin, J. H. - -	S.S. Hector - -	Batavia, viâ Suez - - - -	1893	———
„ „ -	S.S. Ajax - -	China, viâ Suez - - - - -	1894–95	———
Goulding, William -	Barque Cardigan Castle	Adelaide - - - - -	1895–96	T. W. Sanderson, 1st Mate, Cyril Whyte, 2nd Mate.
Grainger, Alexander -	Ship Earl of Zetland -	Melbourne, San Diego, Oregon - -	1894–96	John A. Thomson, Mate.
Grey, Robert, R.N.R.	S.S. Amber - -	Perim, &c. viâ Suez - - - - -	1896	W. F. R. Mist, J. Gibson, and G. C. Hogg.
Grier, J. - - -	S.S. Laertes - -	China, viâ Suez - - - -	1894	———
Griffin, E. J., R.N.R.	R.M.S. Moor - -	Cape Town - - - - - -	1896	Officers.
„ „ - -	„ -	„ - - - -	1896–97	Officers.
Griffiths, William -	Barque Cumbrian -	Adelaide, Newcastle (N.S.W.), Callao -	1895–96	———
Guy, William - -	S.S. Nova Zembla -	Davis Straits and Melville Bay - - -	1896	John J. Cooney, Mate.
		Melbourne - - - - -	1895–96	
Heal, John C. - -	Ship Parthenope - -	To Fremantle, viâ Cape Good Hope -	1896	———
Hepworth, M. W. C., R.N.R.	S.S. Port Melbourne -			A. E. Sprosen, 1st Mate, F. A. Peake, 2nd Mate, C. A. Rowlinson, 3rd Mate.
Hillcoat, C. H. - -	S.S. Britannia - -	Calcutta, viâ Suez - - - - -	1896	John M. Tulloch.
„ „ -	„ -	Bombay, viâ Suez - - - -	1896	„ „ 2nd Officer.
Howard, Lieut. and Comr. W. V. S., R.N.	H.M.S. Dart - -	Off Queensland - - - -	1896	Sub-Lieut. F. May, R.N.
Howe, Percy B. F. -	Ship Roderick Dhu -	To San Francisco - - - -	1895–96	H. B. Harvey.
Jackson, C. - -	S.S. Palamed - -	China, viâ Suez - - -	1892–94	———
„ Chas. -	S.S. Priam - -	„ „ - - - - -	1894	———
„ M. H. F. -	S.S. Telamon - -	„ „ - - - - -	1893–94	———
„ T. S. - -	S.S. Palinurus -	„ „ - - - - -	1893–94	———
Jamieson, D. E. -	S.S. Port Chalmers -	Sydney, viâ Cape Good Hope, and home, viâ Suez.	1896	Frederick Tunbridge, assisted by W. Plugge and E. N. Lewer.

Jensen, J.	Ship Routenburn	From San Francisco	1896	——
Jones, Henry	S.S. Tantalus	China, viâ Suez	1893	——
Kerr, John J.	S.S. Cascapœdia	Monte Video, &c.	1896	A. Paine, Chief Officer, and J. T. Beckerleg, 2nd Officer.
Lapage	S.S. Ulysses	China, viâ Suez	1893–94	——
Latta, William	Ship Lauriston	San Francisco, Sydney, Newcastle (N.S.W.)	1895–97	Messrs. Robert Beatty, Mulqueen, Goodwin and Douler.
Lobb, Staff Commander, F. J., R.N.	L.H. Tender Richmond	Nassau, Bahamas	1896	F. W. Holden, Chief Officer.
Lrison, G. M.	Ship Eaton Hall	Los Angeles and Tacoma	1895–96	John Montador, 3rd Officer, Robert M. Farquhar, 4th Officer, Henry Baxendale, and James Kelland, Apprentices.
Lowe, James	S.S. Duffield	Philadelphia	1896	F. A. White.
„ „	„	„	1896	„
„ „	„	„	1893	„
Martin, T. C.	Ship Loch Tay	Melbourne	1895–96	——
Milburn, B.	Barque Lalla Rookh	Valparaiso	1895–96	——
Miller, A. T., R.N.	School Ship Conway	Off Rock Ferry, Cheshire	1896	The Cadets.
Millican, J. W.	S.S. Loughrigg Holme	East Coast of North America	1895–96	Messrs. S. J. Holm, J. Eland, and Richmond.
„ „	„ „	Quebec and Genoa	1896–97	S. J. Holm and J. Eland.
Milne, W. F.	S.S. Eclipse	Davis Straits	1896	——
Milner, W. H.	R.M.S. Pará	West Indies	1896	Charles Doucett, 3rd Officer.
„ „	„	„	1896	Messrs. Lewis, 2nd Officer, and Brander, 3rd Officer.
„ „	„	„	1896–97	W. O. Lewis, R.N.R., 2nd Officer.
Mitchell, George	S.S. California	New York and Mediterranean Ports	1896	——
Mitchell, John	Barque Cape York	San Francisco	1895–96	C. W. Darling, Chief Mate, Charles Ogilvie, 2nd Mate, and W. E. Edwards, 3rd Mate.
Moignard, Phillip	Ship Garsdale	Newcastle, N.S.W., viâ Cape and Valparaiso	1895–96	T. Sullivan, Chief Officer.

List of Meteorological Logs and Documents received from Ships—*continued.*

Captain's Name.	Ship.	Voyage.	Year.	Officers who have assisted in keeping the Meteorological Register.
Morton, J.	R.M.S. Tartar	Cape Town, &c.	1896–97	G. R. P. Thwaites.
Moseley, F. J., R.N.R.	S.S. Trojan	Cape Town	1896	Bertram E. Dowse and F. Girdler Brown.
Mullan, F. C., F.R.G.S.	S.S. Romney	China and Japan, viâ Suez	1895–96	John Hunter, Mate, E. Holmes, 2nd Officer, and R. Hurford, 3rd Officer.
Murdoch, Peter	Ship Sierra Lucena	Mauritius and Bassein	1895–96	N. P. Pilcher.
Murray, A.	Barque Perseverance	Hudson's Bay	1895–96	——
Nedden, H. zur	S.S. Madeline	India, viâ Suez	1895–96	N. Traill, 2nd Mate.
„ „	„	New York, Savannah, and home	1896	——
„ „	„	East Coast of North America	1896–97	N. Traill, 2nd Mate.
Nelson, R.	S.S. Myrmidon	China, viâ Suez	1893–94	——
Nish, H.	S.S. Cyclops	China, viâ Suez	1891	——
„	S.S. Ixion	China, viâ Suez	1893–94	——
Norman, Francis	Ship Milton Stuart	Calcutta and New York	1895–96	——
Page, R. E.	S.S. Galileo	New York	1896	A. E. Booth, 2nd Officer.
Pattman, R.	Barque Loch Torridon	Cape Town, Melbourne, and Newcastle, N.S.W.	1895	C. Robey, 1st Mate, and D. Bridger, 2nd Mate.
Peebles, R.	S.S. Breconshire	China and Japan, viâ Suez	1896	G. Elliott and A. N. Mell.
„	„	East Coast of North America	1896	George Elliott.
Pitts, F.	S.S. Saladin	Singapore and Fremantle	1890	——
Price, J. H.	Ship Othello	Newcastle (N.S.W.) and Caldera (Chile)	1895–96	——
Pritchard, B. W. S.	Barque Banffshire	Sydney to Mauritius and Lisbon	1893–94	------
Purdy, Thomas	S.S. Dardanus	China, viâ Suez	1892–93	——
Randall, W.	Ship Laomene	San Francisco	1895–96	Mr. Labatt, 1st Mate.
Renaut, W.	Ship Timaru	Lyttleton	1896	Hugh W. Gray, and A. E. Bennett.
Richards, Comr. G. E., R.N.	H.M.S. Rambler	Off East Coast of North America	1896	Lieut. H. A. P. Glossop, R.N.
„ „	„	Jamaica, Belize, and Bermuda	1896	„ „ „
„ „	„	Halifax, Bermuda, Jamaica, and Belize	1896–97	„ „ „

Riley, J.	S.S. Teucer	China, viâ Suez	1893	——
Rogers, B. H.	S.S. Lorenzo	Kurrachee, Alexandria	1896	William Gill, 2nd Officer.
Rorison, I.	S.S. Anchises	Batavia, viâ Suez	1894	——
Rudge, H.	R.M.S. Elbe	East Coast of South America	1896	P. Moore and E. J. Miall.
Rudge, H. E.	S.S. Trent	Brazil	1896	E. J. Miall and C. Garden.
Russell, Edward	Barque Routenbeck	Honolulu, Esquimalt, Iquique, and Philadelphia.	1894–96	Alfred Coulsting, 2nd Mate.
Sargent, A. H.	Ship Pleione	Wellington	1895–96	G. Wood, Chief Officer, and F. Roads, 2nd Officer.
Seator, George T.	Ship Barfillan	San Francisco	1895–96	William Arthur, Chief Officer, and S. Taylor, 2nd Officer.
Simpson, Alexander	S.S. Thermopylæ	Melbourne, viâ Cape Town	1896	W. Douglas, Chief Officer, J. Paterson, 2nd Officer, and H. Trowbridge, 3rd Officer.
" "	"	" "	1896	W. Douglas, J. Paterson, and H. Trowbridge.
Simpson, Alexander	Barquentine Traveller	Ivigtut	1896	——
" "	" "	"	1896	——
Simpson, Lieut. and Comr. C. H., R.N.	H.M.S. Stork	At Malta	1895–96	Lieut. Lewis D. Penfold, R.N.
" "	"	In Mediterranean	1896	" " "
" "	"	"	1896	" " "
Singer, P.	S.S. Den of Airlie	Bombay, viâ Suez	1896	F. T. Woolcott, 3rd Officer.
"	" "	" "	1896	" "
Steeves, T. G.	S.S. Bellerophon	Batavia, viâ Suez	1894	——
" "	S.S. Agamemnon	China viâ Suez	1895	——
Suffern, Robert	Barque Craigerne	(N.S.W.), and Toco-	1895–96	G. M. Collie, 1st Officer, and W. Buchanan, 2nd Officer.
Thomas, H. G., R.N.R.	S.S. Yarrawonga	Adelaide, viâ Cape, and home, viâ Suez	1896	S. Pidgeon, 2nd Officer, L. Gibbs, 3rd Officer, and H. Sandeman, 4th Officer.
" "	"	Sydney, viâ Cape Town, and home, viâ Suez	1896	Messrs. Gibbs, 2nd Officer, Free, 3rd Officer, and Sandeman, 4th Officer.
Towell, W.	S.S. Jason	Batavia, via Suez	1894	——
Trenaman, R. W.	S.S. Pascal	Monte Video and New York	1892–93	——

LIST of METEOROLOGICAL LOGS and DOCUMENTS received from SHIPS —*continued.*

Captain's Name.	Ship.	Voyage.	Year.	Officers who have assisted in keeping the Meteorological Register.
Trenaman, R. W. -	S.S. Lassell - -	Rio Janeiro, St. Lucia, New York - -	1896–97	A. Gittins, 2nd Officer.
Trott, Samuel, F.R.Met.Soc.	S.S. Minia - -	On East Coast of North America - -	1895–96	W. G. Squares, Chief Officer.
" " - -	" - -	At Halifax and home - - -	1896	" "
" " - -	" - -	In the North Atlantic - - - -	1896–97	W. G. Squares, Chief Officer, J. Adams, Navigating Officer, and J. Crasso, 2nd Officer.
Tuke, F. M. - -	R.M.S. Ormuz -	Sydney, viâ Suez - - - -	1896	E. J. Tayler, assisted by F. W. Kershaw and G. H. Jones.
" " - -	" - -	" " - - - -	1896	" " " "
" " - -	" - -	" " - - - -	1896	" " " "
Turner, A. C., R.N.R.	S.S. Britannia - -	New York - - - -	1896	A. W. Thomson.
Tyson, John - -	S.S. Guelph - -	Cape Towu - - - -	1896	John H. Kerbey.
" - -	" - -	" - - - -	1896	" "
Watt, H. F. - -	Barque Elissa - -	Brazil, Barbados, and Mexico - -	1895–96	G. McLeod and A. J. Sharples.
Weir, W. R. - -	Ship Loch Ryan -	Melbourne - - - - -	1895–96	
" " - -	" - -	" - - - -	1896–97	A. V. Brander, Chief Officer.
Williams, G. F. -	Barque Salamanca -	Sydney and Valparaiso - - -	1895–96	
Williams, O. P. -	S.S. Agamemnon -	China, viâ Suez - - - -	1893–94	
Wilson, John, R.N.R. -	S.S. Ethiopia - -	New York - - - - -	1896	James S. Noble, 3rd Officer.
" " " -	" - -	" - - - -	1896	" " "
Worcester, W. D. G., R.N.R.	S.S. Victoria - -	Malta and Cape Town - - -	1896	W. H. Sweny, R.N.R., W. R. Le Mare, R.N.R., G. Rabbitts, R.N.R., and H. Davis, R.N.R.
" "	" - -	Sydney, viâ Suez - - - -	1896	W. H. Sweny, R.N.R., W. R. Le Mare, R.N.R., W. H. Walker, and F. S. Armstrong, R.N.R.
" "	" - -	Bombay, viâ Suez - - - -	1896–97	W. H. Sweny, R.N.R., W. Hayward, R.N.R., W. R. Le Mare, R.N.R., H. G. Evans, R.N.R., and M. Burne, R.N.R.

APPENDIX III.

Instruments supplied, &c. to the Royal Navy.

Per Account.	Barometers.	Aneroids.	Thermometers.				Hydrometers.
			Ordinary.	Max.	Min.	Screens.	
April 1st, 1896, afloat - -	232	601	1,414	372	376	225	54
Issued since - -	92	177	402	74	77	37	8
	324	778	1,816	446	453	262	62
Returned since - -	85	156	357	54	56	25	15
April 1st, 1897, afloat -	239	622	1,459	392	397	237	47

Instruments supplied, &c. for use at Naval Stations.

April 1st, 1896, in use -	77	74	244	34	43	10	11
Issued since - -	1	2	37	5	6	1	—
	78	76	281	39	49	11	11
Returned since - -	4	2	39	6	2	1	—
April 1st, 1897, in use -	74	74	242	33	47	10	11

Disposition of Admiralty Instruments on April 1st, 1897.

Afloat in Royal Navy - -	239	622	1,459	392	397	237	47
In use at stations - -	74	74	242	33	47	10	11
In store at M.O. - -	81	160	250	117	118	27	47
„ Chatham - -	17	53	110	31	32	21	15
„ Sheerness - -	5	18	30	12	12	9	6
„ Portsmouth -	20	48	188	43	46	23	8
„ Devonport -	20	40	116	36	37	15	16
„ Queenstown -	3	2	13	3	3	—	4
„ Gibraltar - -	4	3	9	3	3	—	4
„ Malta - -	10	16	57	9	9	7	6
„ Bombay - -	4	3	11	4	4	—	4
„ Halifax - -	4	4	24	4	3	2	7
„ Bermuda - -	7	6	23	7	9	2	4
„ Jamaica - -	2	3	20	2	2	1	3
„ Cape of Good Hope	1	3	22	4	2	3	4
„ Trincomalee -	5	7	14	2	4	1	4
„ Hong Kong -	13	13	33	10	14	3	21
„ Coquimbo -	3	6	13	4	3	1	19
„ Sydney - -	5	9	24	9	6	2	15
„ Esquimalt - -	4	3	17	3	6	1	4
Total, April 1st, 1897 -	521	1,093	2,625	729	757	365	249
Lost, &c. since April 1st, 1896	2	6	234	19	15	13	3
Under repair April 1st, 1897 -	9	6	—	—	—	—	—

APPENDIX IV.

INSTRUMENTS supplied, &c. to Mercantile Marine.

Per Account.	Barometers.	Compasses.	Thermometers.				Hydrometers.
			Ordinary.	Max.	Min.	Screens.	
April 1st, 1896, afloat - -	112	—	659	—	1	104	373
Issued since - - -	52	—	347	—	—	44	195
	164	—	1,006	—	1	148	568
Returned since - -	56	—	364	—	—	48	212
April 1st, 1897, afloat - -	108	—	642	—	1	100	356

INSTRUMENTS at Stations, viz., Telegraphic Reporting Stations, Observatories, Fishing Villages, &c.

April 1st, 1896, in use - -	298	2	296	61	76	58	16
Issued since - - -	9	1	11	3	5	3	1
	307	3	307	64	81	61	17
Returned since - -	8	1	15	2	8	3	4
April 1st, 1897, in use - -	299*	2	292	62	73	58	13

DISPOSITION of BOARD of TRADE INSTRUMENTS on April 1st, 1897.

In merchant ships - -	108	—	642	—	1	100	356
In use at stations - -	299	2	292	62	73	58	13
In store at M.O. - -	50	3	144	13	30	29	80
At Liverpool Agency -	3	—	18	—	—	5	7
„ Glasgow „ -	3	—	21	—	—	1	14
„ Dundee „ -	5	—	23	—	—	6	18
„ Hull „ -	3	—	15	—	—	3	10
„ Cardiff† „ -	9	—	46	—	—	8	37
„ Southampton „ -	2	—	16	—	—	5	—
Total, April 1st, 1897 -	482	5	1,217	75	104	215	535
Lost, &c. since April 1st, 1896	—	—	94	—	1	12	66
Under repair April 1st, 1897 -	8	—	—	—	—	—	—

* Of these barometers 214 are lent for use of seafaring communities at fishing villages and ports.

† No return since September 30th, 1896.

APPENDIX V.

Report of Partial Inspection of Wales and Ireland.

I have the honour to report that I commenced my inspection on the 26th of September, and had visited four stations when I met with an accident, being thrown off a car in Dublin (September 30th), and incapacitated from going on with the inspections in the present autumn.

Holyhead, visited September 28th.—I found the telegraphic station in good order. The rain-gauge was not quite steady in its stand.

Mr. Cotton seems to be of opinion that the difficulty found in making the top of the Dines' anemometer move freely arises from decomposition of the metal of which the tubes are made.

Newcastle, Co. Wicklow.—This is a locality where a climatological station is to be started at once in connexion with the newly erected consumption hospital. The hospital is actually at Killadreenan, some two miles from Newcastle, and affords an excellent site for the instruments. I visited it on the 29th September, and had an opportunity of going over the grounds with Dr. B. H. Steede, the principal.

Dublin, Fitzwilliam Square, visited September 30th.—This station was, as usual, in perfect order.

Dublin, Glasnevin, visited September 30th.—At this station the thermometer screen was not firmly fixed, and there is reason to suspect that the rain-gauge is not always visited daily. All else was in good order.

(Signed) Robert H. Scott.

Report of Inspection of Scottish Stations for the Year 1896.

Barometers.

The barometers of the stations were compared with inspector's standard No. 690, which was in good order throughout the inspection, as shown by comparisons with the standard in Edinburgh at the beginning and end of the inspections. All the barometers were found to be correct, and they continue to be kept in the same good order as heretofore. Table I. shows the comparisons with No. 690, the readings of the station barometers not being corrected.

Table I.

Stations.	Inspector's Standard No. 690 corrected.	Reporting Barometer uncorrected.	Check Barometer uncorrected.	Remarks.
	Inches.	Inches.	Inches.	
Ladylaw - - -	29·738	29·740	—	
Wolfelee - -	29·530	29·530	—	
Cairgen - - -	29·704	29·695	—	
Glenlee - -	29·735	29·738	—	
Ardrossan - -	30·252	30·253	—	
Rothesay - - -	30·135	30·134	—	
Poltalloch - -	30·025	29·990	—	
Laudale - -	30·116	30·118	30·108	Check barometer hung in lower room.
Fort William - -	29·944	29·959	—	
Nairn - - -	29·956	29·956	29·950	

TABLE I.—*continued.*

STATIONS.	Inspector's Standard No. 690 corrected.	Reporting Barometer uncorrected.	Check Barometer uncorrected.	REMARKS.
	Inches.	Inches.	Inches.	
Strathpeffer - -	29·592	29·594	—	
Dunrobin - - -	29·875	29·875	—	
Wick - - -	29·860	29·856	—	
Dunrossness - -	29·507	29·508	29·515	Check barometer is in good order.
Deerness - -	29·824	29·856	—	
Lairg - - -	29·125	29·110	—	
Aberdeen - -	29·912	29·917	29·915	
Leith - - -	29·030	29·030	29·033	
Edinburgh - -	29·032	29·044	—	

THERMOMETERS.

As in previous inspections, the thermometers were read twice, first by the observer as they hung in the screen, and then by the inspector after they had been in water for the times specified in the table. Except in the case of Nairn, where about half a degree of the spirit was lodged near the top of the tube, all the minimum thermometers were in good order.

TABLE II.

STATIONS.	Inspector's Thermometer, No. 4433.	Dry Bulb.	Wet Bulb.	Spare Thermometer.	Max. Thermometer.	Min. Thermometer.	Time in Water in Minutes.	Change of Temperature.	REMARKS.
Ladylaw -	59°·9	0°·0	0°·0	−0°·1	+0°·1	−0°·1	180	0°·0	
Wolfelee - -	57·9	−0·1	−0·1	—	+0·1	−0·9	90	+0·3	
Cargen - -	58·6	−0·2	−0·2	—	0·0	−0·2	105	−0·2	
Glenlee - -	62·3	+0·2	+0·2	—	−0·1	+0·1	90	−0·4	
Ardrossan -	61·4	+0·3	+0·3	—	0·0	−0·1	105	+0·5	
Rothesay - -	59·4	0·0	0·0	—	+0·1	−0·1	70	+0·3	
Poltalloch -	58·8	+0·2	+0·2	—	+0·9	0·0	110	+0·2	
Laudale -	57·5	+0·2	+0·2	—	+0·1	+0·1	130	0·0	
Fort William -	62·7	+0·3	+0·3	—	0·0	−0·1	160	0·0	
Nairn - -	53·4	+0·7	+0·8	+0·2	+0·2	0·0	25	+0·3	
Strathpeffer -	54·8	−0·1	0·0	—	0·0	−0·2	80	−0·3	
Dunrobin -	58·6	+0·1	+0·1	—	+0·2	−0·1	120	+0·2	
Wick - -	56·1	+0·5	+0·5	—	+0·1	0·0	65	0·0	
Dunrossness -	55·6	+0·5	+0·3	+0·4	+0·1	−0·3	120	0·0	
Deerness -	58·9	+0·2	+0·2	—	−0·8	0·0	125	+0·2	
Aberdeen -	55·9	+0·2	+0·2	—	+0·2	+0·3	70	+0·2	
Leith - -	51·8	+0·1	+0·2	—	−0·1	−0·4	115	0·0	
Edinburgh -	46 1	+0·1	+0·1	—	−0·1	−0·2	60	0·0	
Lairg - -	54·1	—	+0·1	—	−0·1	+0·2	120	0·0	See note on station.

Hygrometers.

Much attention continues to be given to the readings of the dry and wet bulbs as they hang in the screen, immediately the screen is opened. The result of the readings, and the state in which these instruments were found, convinced me that in all cases these thermometers are maintained in good order for hygrometric observations.

Notes of Inspection of the Stations.

Ladylaw, July 27th, 1896.—Nothing could exceed the admirable order in which the instruments are kept, and great zeal and intelligence are manifested in conducting the whole work of this station. At the time of inspection, Mr. Wilson was in excellent health, but died a fortnight after it. The observations continue to be made by his family.

Wolfelee, July 28th.—The instruments at this station continue to be well kept, and the observations made with the greatest care.

Cargen, July 29th.—The instruments are well kept, and the observations are carefully and correctly made by the observer, Mr. Peacock, on whom, since Mr. Dudgeon's death, the whole work now falls.

Glenlee, July 30th.—The instruments are in excellent order, and the observations are made with much skill and intelligence.

Ardrossan, August 6th.—The introduction of the telephone into the post office necessitated the removal of the barometer to another part of the office. This has been satisfactorily done, and the instrument is hung at the same height as before. The thermometer screen was ordered to be repaired and repainted. The other instruments were in very good order, and the observations are made with correctness and intelligence.

Rothesay, August 6th.—The instruments are particularly well attended to, and much enthusiasm is displayed by the observer in securing fullness and accuracy in the observations.

Poltalloch, August 7th.—The instruments are all in very good order, and the observations are made carefully and correctly.

Laudale, August 12th.—The thermometer screen has been still further strengthened against the high winds to which this station is exposed. The instruments are in excellent order, and the observations are made with much care and intelligence.

Fort William, August 13th–14th.—A new check rain-gauge was placed here in March, which, so far, appears to agree with the old check gauge rather than with the Beckley's. The instruments are in excellent order, and all the observations are taken with commendable fullness and correctness.

Fort Augustus, August 15th.—Of this station a hasty inspection was made during the short time the canal steamer was passing the locks. Everything was found in very good order.

Nairn, August 17th.—About half a degree of spirit was lodged near the top of the minimum tube in a position not easily seen. Miss Penny, under direction, put it right. Otherwise the instruments were in excellent order, and the observations are well attended to.

Strathpeffer, August 17th.—For two months the barometer had been removed to a contiguous room, where it was hung at the same height,

Much interest is taken in the observations by Dr. Fox and his son. Everything was in good order, and much intelligence is shown in making the observations.

Dunrobin, August 18th.—All the instruments are in very good order, and the observations continue to be made with the greatest care.

Wick, August 19th.—I was informed that the recent delay in the despatch of the telegrams from Wick was due to the press of telegrams during the herring fishery. The instruments are kept in excellent order, and very considerable intelligence is manifested in the work of observing.

Dunrossness (*Sumburgh Head*), August 21st.—The instruments are in good order, and the observations are made with care and correctness. In future the observer will telegraph with greater regularity the extreme readings from the barogram, notes of weather, and the late observations.

Deerness, August 22nd.—All the instruments are in excellent order, and no effort is spared to render the observations full and accurate. An estimate of the force of the wind, independent of the anemometric readings, will in future be made.

Lairg, August 25th.—This station was visited for the double object of inspection and obtaining a new observer. Through the kind assistance of the Rev. Dr. Joass, of Golspie, the services of the Rev. D. Macrae, minister of the parish of Lairg, have been secured. From what I have seen of Mr. M., he will prove to be a desirable observer for this station. The barometer was first compared with the inspector's standard at the old station at the schoolhouse, and thereafter at its new position at the manse, with these results :—

—	Inspector's Standard 690.		Station Barometer.	
10.30 a.m. Readings at old station - - -	29·225	58·0	29·210	57·5
11.0 „ Readings at new station - -	29·125	57·0	29·110	57·0
1.35 p.m. „ „ „ - - -	29·143	57·0	29·128	57·0

This difference between the two barometers is in accordance with the known error of this instrument.

The dry bulb at this station was found broken. A new hygrometer has since been sent. The Kew corrections of both thermometers at all points are 0·0, and the old wet bulb is to be retained as a spare thermometer. Before leaving, the instruments were placed in their new positions.

Aberdeen, August 28th.—The instruments both at this station and the observatory are kept in excellent order, and the observations are made with care and exactness. Inquiries were made regarding the late arrivals on Sundays of the daily telegrams at the Meteorological Office; and I was informed that the lateness was mainly occasioned by the change of clerks during the holiday season.

Leith, October 8th.—The instruments and observations are both particularly well attended to. Since last inspection a block of houses, four stories high, has been built at about 20 yards from the instruments. Inquiries are consequently being made for a new position for the station.

Edinburgh, October 24th.—The instruments at this station include, in addition to the usual instruments, a barograph, a thermograph, a

hygrograph, a Richard's registering rain-gauge, a storm rain-gauge, a sunshine recorder, and three underground thermometers. All the instruments were in excellent order, and much care and enthusiasm is displayed in making the observations.

(Signed) ALEXANDER BUCHAN,
Inspector.

REPORTS OF INSPECTION OF THE ENGLISH STATIONS.

Clifton, Weekly Weather Report Station, September 5th.—The station is 230 feet above M.S.L., and is situated in one of the quadrangles of of Clifton College. The Clifton Down to the south-west, and the Durdham Down to the north, have a considerably higher elevation. The thermometers and rain-gauge are in a railed enclosure, near the centre of the quadrangle; the door of the screen opens to the southward, and does not stand over grass, and the college buildings and trees would apparently cut off the sunshine in the morning and evening. The observer, Mr. Rintoul, was absent, but I saw one of the clerks of the secretary's office, who takes the observations when necessary. The instruments are evidently well attended to, and the readings are regularly posted up.

Arlington Court, Weekly Weather Report Station, September 7th.—The instruments were in good condition, but the covering of the wet bulb was rather too thick. The observer has been recently changed, so I explained the method of mounting the wet bulb, and its management in case of frost. The rain-gauge (which is a 5-inch one) was out of level, and was put right; it is only kept in position by wooden stays. The exposure at this station is excellent, and the observer takes interest in the observations.

Prawle Point, Reporting Station, September 8th.—Everything was in good order at this station except that the rain-gauge required slight repair (which has since been attended to), and that the tube of the dry-bulb thermometer was possibly cracked, and was stuck with sealing-wax. This instrument has now been removed from the screen. Mr. Howse, Chief Officer of Coastguard, seems to be very attentive to the work, and the wet-bulb thermometer was clean and well mounted.

Plymouth, Second Order Station, September 9th.—Mr. Prigg, the borough meteorologist, is very enthusiastic in the work, and spends much of his private time in connexion with it. The position on the Hoe is possibly the best that can be found near the town; the only obstruction to the sun would be for an hour or so in the early morning from the Citadel, except in the summer season. There is a small cooking stove in the room in which the barometer hangs, and there is also a slab at the foot of the thermometer screen; the observer promised to have part of it cut away. I also visited a second rain-gauge in Freedom Fields, situated at a higher level than the Hoe. All the instruments are carefully kept and attended to, and the observer hopes to add to their number in course of time.

Guernsey, Sunshine Station, September 11th.—The instrument is one of Jordan's, and is exposed in a good position; the sun would only be obstructed in the evening. Dr. Carey measures the photographic trace before it is fixed. He has a complete set of instruments for a station such as those reporting weekly, and two rain-gauges, an 8-inch and a 5-inch; the latter is well placed in a garden to the south of the house.

Jersey, Reporting Station, September 12th and 13th.—The instruments at St. Aubins were all in good condition, the wet bulb clean and properly mounted, and the observer is much interested in the work. Mr. Fisher also has charge of a fishery barometer (Negretti and Zambra, No. 275), and the readings are regularly posted up on forms purchased for the purpose. Mr. Fisher would be glad to have forms from the Meteorological Office. I also inspected the sunshine recorder on Fort Regent, St. Helier's. There was no sunshine at the time, but the instrument is very firmly fixed, and level, while an inspection of the cards showed that it was apparently truly set for latitude. The only possible obstruction to the sunshine might arise for a short time in the evening, in winter time, from adjacent chimney pots.

I subjoin the table of the thermometer comparisons:—

Stations.	Standard corrected.	Corrections to be applied.						Remarks.
		Dry Bulb.	Wet Bulb.	Spare Therm.	Max. Therm.	Min. Therm.	Grass Min.	
Clifton - -	61°·2	−0°·5	−0°·5	—	+0°·6	0°·0	—	
Arlington Court.	56·9	+0·2	+0·1	—	+0·1	+0·5	—	
Prawle Point -	60·9	−0·4*	+0·2	−0·1	−0·1	−0·2	—	* Damaged.
Plymouth -	61·5	−0·3	−0·2	—	+0·2	+0·5	0·0	
Jersey - -	61·7	−0·6	−0·7	—	−0·3	+0·5	—	No spare therm.

(Signed) J. S. Harding.

Chester.—Observer, Rev. J. C. Mitchell, B.D. Second Order Station. Inspected, July 20. Instruments in good order, and located the same as at last inspection. The minimum thermometer gave indications 0°·7 below the standard (B.T. 4569) which I carried with me, and the barometrical readings agreed exactly with those of the barometer I took with me. I checked a duplicate set of thermometers by Sidall, which had been lent to observer, and found the dry bulb indicated values rather (0°·6) too high, the wet bulb and maximum were both accurate, but the minimum was 2°·2 too low. Were it not for the fact that there is a road running beside the garden in which the outdoor instruments are exposed, and that the neighbourhood is very open, I should say the exposure of the thermometers is very defective. I report that now because the erection of any buildings contiguous to the garden would render the observations valueless.

Colwyn Bay.—Observer, D. Lord. Sunshine recording station. Instruments—a Campbell-Stokes recorder and a Jordan—very well exposed, and carefully attended to.

Bidston Observatory, Birkenhead.—The principal object in visiting this station was to see whether the indications of all the thermometers agreed. A series of careful comparisons were made, with the result that while the *dry bulb*, No. 2,551, read about 0° 5 too high, the *minimum*, No. 3,488, gave indications 0°·6 too low, and No. K.O. 41,250 1°·7 too low. All the other thermometers were correct.

Cronkbourne.—Isle of Man.—Observer, A. W. Moore. Instruments good, well exposed, and apparently well attended to. I could not see Mr. Moore, but the gardener, who takes many of the observations, is in every way a competent observer. The minimum thermometer gives

indications 0°·4 too low, the dry and wet 0°·6 too high. All else was well.

St. Helen's.—The instruments are under the control of Dr. Robertson, and are placed in a very good position in the public park. The indications of the barometer and the thermometers agree very well indeed with those of the standards used by the inspector, and the park keeper, who takes most of the readings, appears to be a very intelligent man and very painstaking.

Southport.—There is a full supply of instruments at this station, but it is only the sunshine records which are forwarded to the Meteorological Office. The instrument is a good one (Campbell-Stokes), and the exposure very good. Mr. Baxendell is a most enthusiastic worker, and his assistants share his spirit and are very careful workers. The difference between the indications of the Campbell-Stokes recorder and those of a Jordan (Twin) recorder close by are extraordinarily variable.

Manchester—Oldham Road.—At this station the instruments are placed on a circular plot of grass 22 feet in diameter, and this is situated in a large rectangle about 130 feet square. This rectangle is surrounded by buildings, the angle from which to the centre is about 23° all round, and is considered by Dr. Niven to represent very nearly the general conditions prevalent within Manchester itself. The thermometers are very good and accurate instruments, and the barometer (a Fortin's Standard) agreed in its indications with the standard (B. T. 789) which I had with me. The observer (the officer in charge of the works) was thoroughly competent to do the work, and gave me every assistance.

Prestwich—County Asylum.—Inspected 27th July 1896. Dr. Clunn was absent when I called, but I saw Dr. Ley, and the officer who usually takes the observations rendered every assistance necessary. The barometer (Adie B.T. 602) was in close agreement with No. 789, which was in my charge as a standard, and the observer's readings and mine agreed. The thermometers are very good instruments, and are well exposed. The sunshine recorder is *slightly* sheltered in an easterly direction, but well exposed in other directions. I would point out that the position of the outdoor instrument is very different from that occupied when I inspected the station in 1888, but the change is an improvement, and the present exposure could hardly be improved.

Heysham Hall, Morecambe—(Second Order).—The instruments at this station were very good, and were apparently carefully attended to by the gardener. There were discrepancies in the barometer readings, to which I gave special attention, and as far as I could gather they were caused by the fact that the rack and pinion had become loose and, as a result, the vernier, after being set, occasionally slipped down a little, and the readings were consequently at times defective. I put this right, and think the readings will improve, as the observer appeared anxious to take and report them accurately. The thermometers were very fairly correct—excepting the solar radiation thermometer (No. 204), which was about 7° too bigh.

Sedbergh—"Gate."—A rainfall station. The instrument is a very good 5-inch copper gauge, placed on the retaining wall of a garden, cut in a bank of the hill on which the residence and garden are placed. Its rim was level and the instrument firmly fixed, but it was too much dominated by high trees to the eastward. The observations are taken regularly at 9 a.m. I gave full instructions as to the method of measuring snow, &c. There is no probability of a complete set of instruments being started. The rains are often very local in character.

Gilcrux.—Observer Mr. Monkhouse. Inspected on July 31st. Observer was in attendance. Instruments are all very good, are well exposed, and carefully read. The grass minimum, however, had about 4° of spirit at top of tube, which I dislodged—the instrument then read correctly, but for some time (I could not find out for how long) these readings must have been 4° too low. Barometer very good, and accurately read.

East Marton, near Skipton.—Inspected August 1st. Observer (Mr. Ecroyd) was absent, but his clerk showed me all the instruments, and aided in comparing them. Instruments all very good, and well exposed, but the solar radiation thermometer is a Negretti's maximum (not in vacuo) and has a bright black bulb. Rain-gauge is a 5-inch Snowdon pattern, rim 10 ins. above ground and 573 feet above sea level. Barometer (Fortin's standard) read rather lower than the instrument I had with me.

Chapel-en-le-Frith.—Inspected on August 2nd. Observations having been tendered by the observer, I called to see what the station was like. It is in every way unfit for scientific work.

Irish and Welsh Stations.

I beg to report that in October I proceeded to Ireland in order to inspect some of the Irish Stations, which Mr. Scott was unable to see owing to his accident (p. 33).

Londonderry.—Observer Mr. J. Conroy. Inspected on October 21st. Observer was away, but his son showed me the instruments. The exposure is bad, the garden too small, and there are too many trees, shrubs, &c. about. Thermometer screen is too small, and is only single louvred. Thermometers are not Kew verified, but are fairly good. Rain-gauge, 5 ins. diameter, was *much* too close to trees, about 15 feet high, at east end of garden. I had the gauge removed to a less objectionable position, and gave advice as to obtaining a new screen—but the position in that garden can never be good.

Malin Head.—Inspected 23rd August. Observer was in attendance. Barometers agree well, but their frames are very dirty and the shield of one is broken. Observer sets and reads them accurately. Gave observer careful instructions how to use his self-recording aneroid in order to report "extreme" readings of barometer properly. Thermometers agreed well with my standard, but wet bulb was rather dirty. Observer very intelligent, and promises to follow the instructions given him.

Omagh.—Visited on October 24th. Observer Colonel Buchanan. The object in visiting this station was to clear up a question as to the accuracy of certain temperature observations forwarded to the Meteorological Office in August last. It appears that observer was then away from home, and that in his absence his clerk had used a defective Six's thermometer to report from, and had exposed it in a bad position. Colonel Buchanan expressed his great regret at the occurrence, and undertook that it should not occur again. The thermometers he usually reports from are very good instruments, and are well exposed in a proper Stevenson's screen. Rain-gauge well exposed.

Belmullet.—Telegraphic Reporting Station. Inspected on October 28th. Barometers in very good order and agree fairly well. New observer (Miss E. Tolan) set them too low, until properly instructed. Thermometers are in a yard at some distance from the house. The dry, wet, and maximum thermometers were in good order, but the

spirit of the minimum was *much* broken, and the readings for some time past cannot have been of any value. I united the column and set the index correctly. The screen legs were rotten, and I gave instructions to have them repaired. Rain-gauge was very clean and in good order. Vane was not quite free; saw the "line man," and gave careful instructions as to keeping the vane greased. Bearings are true. Also gave such instructions as I could about cloud observations. Visited coast guard officer, and expelled all air from fishery barometer which had been sent there from Elly Bay.

Llandovery.—Weekly Weather Report Station. Observer (Mr. Watkin) was at home. Thermometers are very poor, and are not exposed in a proper Stevenson's screen. Undue *range* of temperature is thus recorded, both maxima and minima being affected. Rain-gauge (5 ins.) is well exposed. Observations taken carefully and regularly.

The comparisons made between the instruments at the various stations and the standards which I had with me show that the following corrections are necessary to bring the indications of the station instruments into accord with the standards.

Corrections necessary for Thermometers.

Names of Stations.	Corrections to Thermometer—						Temp. of Water.
	Dry.	Wet.	Max.	Min.	Terrest. Rad.	Spare.	
			Stations in the N.W. of England.				
Chester—2nd Order	0·0	+0·2	+0·7	−0·1	+0·6	—	74·7
„ —Duplicate set by Sidal.	−0·6	0·0	0·0	+2·2	—	—	70·2
Bidston Obs.—Tel. Rep.	−0·5	−0·1	−0·1	+0·6	—	—	63·2
„ —2nd Order	—	—	0·0	+0·7	—	—	63·6
Cronkbourne—2nd Order	−0·6	−0·6	−0·1	+0·4	+0·1	—	59·4
St. Helen's—2nd Order	0·0	+0·5	0·0	+0·5	—	Earth +0·5	62·9
Manchester, Oldham Road, —2nd Order.	0·0	0·0	+0·3	+0·3	+0·1	—	61·3
Prestwich—2nd Order	−0·5	−0·2	0·0	+0·1	+0·2	—	61·3
Heysham—2nd Order	−0·4	−0·1	−0·4	+0·1	+0·1	—	58·3
Gilcrux—2nd Order	0·0	−0·1	−0·1	0·0	+0·1	—	57·2
E. Marton—2nd Order	0·0	−0·1	+0·6	0·0	−0·1	—	58·9
			Irish and Welsh Stations.				
Londonderry—W. W. Rep.	−0·7	−0·7	−0·1	−0·1	—	—	44·9
Malin Head—Tel. Rep.	0·0	0·0	+0·1	−0·1	—	—	42·9
Omagh—W. W. Rep.	—	—	0·0	−0·1	—	Second Stand	49·0
„ —Six's Ther.	—	—	+3·7	+4·7	—	−0·7	49·0
Belmullet—Tel. Rep.	0·0	0·0	+0·1	+1·6*	—	—	45·0
Llandovery—W. W. R.	—	—	−0·7	+0·9	—	—	43·0

* After being adjusted, observer instructed to add 1° daily till further orders.

(Signed) Fredc. Gaster.

English Stations.

Oxford, August 5th and 6th.—The instruments are in excellent condition, and carefully read. Much care was given to the barometer comparison, as the difference of reading in instruments compared,

ranging between 0·015 in. and 0·020 in., seemed unduly large. Ample time was given for the Office barometer to take up its proper reading, which, however, it did somewhat tardily. The base of sunshine recorder is not fixed.

Churchill, August 6th.—At present only a rainfall station. The exposure of gauge is good, and the observations are evidently made with great regularity and with care. The responsible observer was away from home, and no information could be gained as to prospect of obtaining other observations.

Cirencester, August 7th.—The instruments are in good order, and the regular observer shows great intelligence and precision in observation. The exposure of many of the instruments is bad, owing to their being overcrowded. Sunshine recorder, anemometer, thermometer, screen, solar and terrestrial radiation thermometers, and rain-gauge being crowded into a small railed space for safety and protection. The exposure of rain-gauge is especially bad, and a better exposure could easily be found. The grass thermometer is completely caged in, and has some 9 inches or 1 foot above it a caging of fairly thick iron rods. Professor Ohm, who is responsible for the observations, being away, no action could be taken with respect to removal of instruments.

Dursley, August 8th.—At present only a rainfall station. The position of rain-gauge was removed a distance of between 2 and 3 miles on August 1st. The old exposure was not good. The removal has effected a considerable improvement, and exposure is now good if plants around are kept down. The observer's attention was especially called to the necessity of seeing that gauge is not sheltered.

Kidderminster, August 10th.—The thermometers and rain-gauge are well exposed, and the observer has all the qualities necessary for keeping good returns. A piece of ground has been rented some little distance from the Town Hall (the municipal authorities having full control of the observations), so that instruments should have a good exposure; this piece of ground is well protected, and the instruments cannot be easily tampered with. There is a Stevenson's screen, and this, together with rain-gauge, is railed in as a further safeguard. The gauge was sheltered by the screen, and I recommended the raising of gauge to 5 feet 9 inches, to avoid shelter; this the observer promised to effect at once.

Rochford, August 11th.—Rainfall and self-registering aneroid observations at present forwarded. The position of rain-gauge has been altered since last inspection, and exposure is now exceptionally good. The observer intends getting a Stevenson's screen and full set of thermometers. I recommended position for Stevenson's screen.

Shirley (*near Birmingham*), August 12th.—The observer has recently removed from Solihull. The height of ground is 470 feet, as determined by B. M. on sign-post close to house. The exposure of Stevenson's screen is excellent. Rain-gauge has also a very good exposure. The observer has promised to enclose rain-gauge with a rail to keep the cattle away.

Rugby, August 12th and 13th.—The responsible observer was just starting on holiday, and I could only see him a few minutes. The peculiarities in returns were pointed out, and instructions given in the making of barometrical reductions. The gardener, who takes most of the observations, is intelligent. The barometer and its position have been recently changed; now in entrance hall to school, and is 380 feet

above sea level. Stevenson's screen is too much sheltered, and only in direct rays of sun from about 10 a.m. to 2 p.m. The rain-gauge is very much sheltered. The exposure of grass thermometer is bad.

Syston (near Leicester), August 13th.—At present only a rainfall station. The observer is very intelligent and careful. The rain-gauge is very rough in form, and made locally, the diameter is 5·2 inches instead of exactly 5 inches. Observer is anxious to take temperature observations, and he intends getting screen and thermometers.

Thurcaston, August 13th and 14th.—Only sunshine records received from this station. The burning of the cards, &c. showed certain defects existed. Remedied defects in fixing and adjustment as far as possible. Sunshine at time of inspection very broken, and sun only visible for a few minutes at a time.

Loughborough, August 15th.—The instruments are all in excellent order, and the observations are made with the greatest care and regularity. The observer has himself taken every observation for the last 13 years.

Duddington, August 17th.—This is only a rainfall station, and had not previously been inspected, although observer had kept observations for Office. The observer was away from home. The records are from a 5-inch gauge, and evidently kept with care and regularity. The exposure is not altogether satisfactory, and this was explained to observer in writing.

Colley Weston, August 17th.—This is only a rainfall station Observer is evidently careful and regular. The rain-gauge has been shifted slightly since last inspected, and its position is not altogether satisfactory, being somewhat sheltered by neighbouring plants. Selected another position for gauge, and observer promised it should be at once removed. The new position will be a satisfactory exposure.

Ketton Hall, Stamford, August 17th.—Observations seem well and regularly made. The exposure of thermometers in Stevenson's screen very good; the wet bulb was mounted but not in action. The grass thermometer had been removed for examination; its exposure was good, except that it is caged on all sides by close wire-netting 1 foot high, but open at top. The rain-gauge has been moved since last inspected, now well exposed, except for temporary shelter from flowering plants; the observer promised this should be remedied at once.

Cambridge, August 18th.—The instruments are in excellent order, and observer evidently takes a keen interest in the observations. The rain-gauge is somewhat sheltered to south and east by trees. The sunshine recorder would also be sheltered to south-east by same trees in winter at about 9·30 or 10 a.m. Observer promised to report screening of rain-gauge and sunshine recorder to Sir Robert Ball, with recommendation that elm trees be lopped. The sunshine recorder is slightly out of level, being highest at east, but as instrument is firmly cemented, no alteration is suggested.

Geldeston, August 19th.—The instruments are in excellent order, and the observations evidently made with great care. The rain-gauge is sheltered by a disused Stevenson's screen, 2 yards distant to the north-west. Recommended that this be removed. I adjusted the thermograph (dry and wet) at the request of observer.

Yarmouth, August 20th.—Observations taken regularly and with care. The Stevenson's screen, containing thermometers, is on the north

side of a wall which affords considerable shelter from sun. The observer is quite willing that screen should be removed to the open. Selected a spot, but left directions for removal to be sent from Office, as station has been going many years. Rain-gauge partially sheltered by large shrub, which observer promised to cut back. Self-registering aneroid partially adjusted, the error being reduced by about one half; the screw affixed for adjustment evidently not in action.

Barometers.

Stations.	Inspector's Standard No. 789 corrected.	Reporting Barometer uncorrected.	Check Barometer uncorrected.
	Inches.	Inches.	Inches.
Oxford	30·065	30·048	—
Cirencester	29·765	29·728	—
Shirley, near Birmingham	29·878	29·870	—
Rugby	29·783	29·770	—
Loughborough	29·942	29·932	—
Cambridge	30·017	30·000	—
Geldeston	29·875	29·873	—
Yarmouth	29·987	29·985	29·971

Thermometers.

Stations.	Reading of Standard.	Corrections to be applied to the Readings of the—						Remarks.
		Dry Bulb.	Wet Bulb.	Spare Therm.	Max. Therm.	Min. Therm.	Grass Therm.	
		°	°	°		°	°	
Oxford	61·8	−0·1	−0·1	—	−0·2	+0·2	+0·6 +3·2	Long bulb. Spherical bulb.
Cirencester	59·6	−0·3	−0·2	—	−0·1	+0·2	+0·2	
Kidderminster	60·7	−0·1	−0·1	—	+0·7	+0·7	—	
Shirley, (near Birmingham).	62·2	+0·1	+0·1	—	+0·1	+0·2	—	
Rugby	63·5	−0·3	+0·2	—	+0·4	+0·3	−0·3	
Loughborough	62·1	0·0	+0·1	+0·1	−0·1	+0·2	+1·1	
Ketton Hall, Stamford.	53·5	−1·3	−1·0	—	−0·8	−0·5	—	
Cambridge	60·4	−0·9	−1·0	—	−1·5	+0·4	—	
Geldeston	59·9	−0·3	−0·3	−0·4	−0·7	+0·7	—	
Yarmouth	63·8	0·0	+0·1	−0·6	−0·2	+0·8	—	

(Signed) Charles Harding.

Anemometer Station.

Scilly, August 25th–28th.—*Robinson Anemometer.*—I found this instrument in fairly good order, but the brake was not acting properly,

owing to an insufficient supply of oil in the brake-box. During the year the lubricant supplied from Kew last August had thickened, and caused the pistons to stick, preventing the vane from turning; to remedy this the box had been opened, and in putting it together again it had not had a sufficient supply of oil put into it. All parts of the instrument were examined and cleaned, and left in good order. I found the time pricker was out of its proper place, and I instructed the observer to allow for the error in putting on his sheets. I also determined very carefully the bearings of the instrument, and gave the observer a good mark, true south, for use in orienting the vane. I used sperm oil for lubrication, and left a supply for use during the ensuing twelve months.

Pressure-tube Anemometer.—I opened this instrument, and examined it very carefully. Its condition was in every way quite satisfactory; the water in the container was clean, as were also all the interior portions of the instrument. The glass shade had been broken, and a new one has now been sent to replace it. Outside it was also in good order, and the vane was perfectly free, and, I was told, had never shown the slightest tendency to stick. Some trouble had, however, been experienced with the traces, which I found arose from the way in which the pens were put on and used; this was pointed out, and the traces are now much better.

Telegraphic Reporting Stations.

Scilly, August 27th.—The general condition of this station was satisfactory, and the observer is, I think, careful in his work. I found that the louvres of the thermometer screen had become loose, and the legs below the ground decayed, and these defects were made good. I also removed the rain-gauge to a new site, near the anemometers, because there was no doubt that in its old position it was affected, especially during northerly winds, by the high wall of the bastion in which it was placed; in its new position it has a free exposure all round, and is protected from interference by a very open rail.

North Shields, September 8th.—Here also the thermometer screen required repair, and I gave instructions for it to be done. The rain-gauge is much battered, and, in its present position, is liable to be interfered with by children. I found indications of this having recently taken place. In every other respect the station was in very good order, and the observer is evidently very careful and painstaking.

York, September 12th and 14th.—The thermometer screen now occupies a satisfactory position to the north of the museum, free from trees or other obstructions. The thermometers are, however, not suspended in a satisfactory manner; they are bound by wire to pieces of wood, which are screwed at their ends to the roof of the screen, and to get at the instruments these pieces of wood have to be unscrewed every time; the screen is also overcrowded. There is no spare thermometer, and both the maximum and the wet-bulb thermometers are loose on their scales, the clamps being corroded and broken. The screen is nearly black, and I requested that it should be repainted. I also suggested the use of another vane than that now employed, for wind direction.

Spurn Head, September 15th.—With the exception of the rain-gauge, everything here was in a very satisfactory condition, and the

observer appears to be a very intelligent man, much interested in his work. The gauge was placed in a hollow in the low sand hills, where it was impossible to prevent it from becoming filled with the drifting sand, particularly in windy weather. It has now been raised on a post 3 feet above the ground, where it will be far less subject to this drawback. The barometers are now hung in a very good light, in the lower room of the new lighthouse. The thermometer screen needed a few small repairs.

Other Stations.

Newquay, August 29th–31st.—The sunshine recorder was loose, the fastenings having given way last winter in a gale; it was therefore somewhat out of adjustment, and the ball was also not quite central in the bowl. In consequence of the unsettled weather, I feared to undertake the latter adjustment, lest I should not have sunshine to aid me in replacing it; but I made the other adjustments, and secured the base in its place as firmly as the rather decayed state of the stand would allow. The instrument appears to be rather better looked after now than has been the case of late.

Newcastle-on-Tyne, September 8th and 9th.—Everything at this station was in excellent order, and the observations are carefully made. I inspected a garden in front of Mr. Martin's residence, and selected sites for another thermometer screen and rain-gauge, which it is proposed to erect there with a view to comparing the observations with those made at Northumberland Road.

Alnwick Castle, September 9th.—I arranged here that the temperature observations sent in future should be those taken from the thermometers in the Stevenson screen, and not from the large window thermometer hitherto used. The position of the screen and of the rain-gauge, in the garden, is very good, and the instruments are carefully attended to by the gardener.

Seaham Harbour, September 10th.—The instruments were all in good order with the exception of the minimum thermometer, which had a degree of spirit at the top of the tube. The observations are carefully made, and the observer is much interested in the work.

Durham, September 11th.—Everything at this observatory was in excellent order. It is probable that a Stevenson thermometer screen will be erected shortly, in addition to the Glaisher screen at present in use.

Oswald Kirk, September 12th.—This is a sunshine station which had not been visited before. The exposure of the instrument is somewhat interfered with in summer for morning and evening sunshine, but much trouble has been taken by Mr. Thompson to make it as good as possible, and the station represents a very important district.

York, 51 *Bootham*, September 12th and 14th.—The sunshine recorder was not only out of adjustment as regards position, but also out of focus. I dismounted it and re-set the lens, and then re-adjusted it properly. I found that the wrong cards were in use, and the record was being lost in consequence, but a promise was given that this should not occur again, and I think the system now adopted of calling for the card daily will prevent some of the faults which have existed in the past.

Market Rasen, September 16th.—The observer was absent from home, but the observations are carefully made, although the returns to the Office are considerably in arrear; the assistant observer promised that this should be attended to.

Tealby, September 16th.—The observations are carefully made, but the position of the rain-gauge is not altogether satisfactory; the other instruments are well placed, and their condition was quite satisfactory.

Hesley Hall, September 17th.—The wet bulb was very dirty, and had far too much muslin round it, and the rain-gauge is much battered and dented. As far as I could judge, the observations are punctually made, but I had no opportunity of judging as to the care used in reading the instruments.

Sheffield, September 18th.—Everything at this station was in excellent order, and much care is given to the observations. I selected a site for a sunshine recorder which it has been decided to erect.

Worksop, September 18th.—This is a very carefully arranged station. The position of the instruments leaves nothing to be desired, and the observations are taken with great care and punctuality.

Fulbeck, September 19th.—A new thermometer screen and thermometers and a barometer have been added since the last inspection, and the observer is desirous of adding a sunshine recorder to his equipment. The instruments are well placed, and, I should judge, carefully attended to, but unfortunately the observer was absent from home on the day of my visit.

Belvoir Castle, September 21st.—The instruments here were in a fairly good condition, and I think the observations are carefully made, although the work appears to be a good deal subdivided. Mr. Divers superintends it, and is anxious that it should be as correct as possible.

Barometer Comparisons, 1896.

Stations.	Inspector's Standard B. T. 426 (corrected).	Reporting Barometer (uncorrected).	Check Barometer (uncorrected).	Correction required to reduce Reporting Bar. to Standard.	Remarks.
Scilly - - -	—	30·190	30·190	—	
Newcastle-on-Tyne -	29·895	29·894	—	+·001	
North Shields - -	29·903	29·886	29·892	+·017	
Seaham - -	29·598	29·602	—	−·004	
Durham - - -	29·443	29·437	—	+·006	
York - - -	29·347	29·350	—	−·003	The "check" barometer is a wood-cased instrument, very dirty, and never used.
Spurn Head - -	29·803	29·798	29·798	+·005	
Tealby - -	29·710	29·700	—	+·010	
Sheffield - - -	29·287	29·287	—	·000	
Fulbeck - -	29·553	29·559	—	−·006	
Belvoir Castle - -	29·536	29·564	—	−·028	

Thermometer Corrections, 1896.

Stations.	Standard corrected B. T. 5118.	Dry.	Wet.	Spare.	Max.	Min.	Grass Min.	Notes.
Scilly - -	61·0	−0·7	−0·5	−0·1	−0·6	0·0	—	
Newcastle - on - Tyne.	60·0	−0·1	−0·1	—	−0·3	+0·2	—	
Alnwick Castle -	57·5	—	—	—	0·0	0·0	—	Large size window thermometer.
	65·0	−0·1	−0·2	—	−0·2	0·0	—	
North Shields -	60·0	0·0	−0·3	0·0	−0·1	+0·7	—	
Seaham - -	62·2	−0 8	−0·7	−0·6	+0·3	+0·7	—	
Durham - -	56·2	−0·5	−0·5	—	−0·6	+0·1	—	
York (Telegraphic).	60·6	−0·4	−0·4	—	−0·6	+0·7	—	
York (Second Order).	60·6	−0·4	−0·4	—	−0·2	+0·3	—	
Spurn Head -	61·3	−0·7	−0·4	0·0	+0·1	+0·1	—	The present "spare" instrument is for the future to be the dry, the latter being kept as the reserve thermometer.
Tealby - -	54·4	−0·4	−0·4	−0·4	−0·4	+0·1	—	
Bawtry - -	61·1	0·0	−0·1	—	−0·5	0·0	—	
Sheffield . -	56·1	−0·3	−0·6	—	−0·2	−0·2	—	
Fulbeck - -	59·8	−0·1	−0·2	—	−0·3	+0·5	—	
Belvoir Castle -	56·0	0·0	−0·1	—	+0·3	Read P.M. +0·2 +0·1 Read A.M.	+0·4	Max. is difficult to set.

(Signed) R. H. Curtis.

Telegraphic Reporting Stations.

Dungeness, September 8th.—I found everything in good order at this station, except that the wet bulb was slightly coated with lime, and not properly mounted.

Hurst Castle, September 15th.—I spent a long time at this station, and went over the details of the work carefully with the observer, calling special attention to errors which had been noted in his telegrams, and pointing out how similar mistakes might be avoided in the future. The wet bulb was thickly coated with lime. This I removed, and instructed the observer to keep the bulb bright in future.

The rain-gauge was in the improved position assigned to it in 1894, but it was not firmly fixed. It was promised that this should be rectified at once.

North Foreland, September 3rd.—At the time of my visit the observer was in the Isle of Wight on relief duty, and the observations were being taken by Mr. Brown, the coastguard signalman, who is a competent observer, and who has frequently acted on previous occasions. All was in good order, except that some large plants were growing close to the thermometer screen. I gave instructions that these should be removed, and turf laid down instead.

Stations of the Second Order.

Bramley, September 18th.—I found everything in good order at this station. Mr. Bartlett being anxious to remove the thermometer screen, I selected a new position for it, about 10 feet nearer the house. The change will not affect the observations.

Epsom, September 23rd.—The responsible observer at this station has been recently changed, and Mr. Gardiner, the new science master, is quite strange to the work. The actual observations are still taken by two of the students, and with these and with Mr. Gardiner I went over the details of the work as fully as time permitted. I found the wet bulb dirty and badly mounted, but I gave the requisite instructions.

Eastbourne, September 9th.—I found everything in good order at this station, and Mr. Sheward, the observer, is certainly very zealous and painstaking. The instruments, however, are widely scattered, and in consequence there is an interval of 15 minutes between the times of reading the thermometers and the barometer. The former are always read at 9 a.m. and 9 p.m., the latter at 8.45 a.m. and 9.15 p.m.

Parkstone, September 14th.—Everything was in excellent order at this exceedingly well-equipped and well-managed station.

St. Leonards, September 8th.—The outdoor observations are taken by Mr. Kershaw at the Gensing Gardens. I found him to be a careful observer, and I think the instruments are well attended to, though the muslin on the wet bulb was rather dirty. The barometer remains in Dr. Colborne's house. Dr. Colborne impressed me as being a competent observer, but as unable to give the time necessary to keep the record well up to date. He has lately succeeded in getting the Town Council to establish a second station, with verified thermometers and rain-gauge, at West Marina, the extreme west of St. Leonards, on the sea front. Doubtless the observations would be supplied to the Meteorological Office if desired, and the comparison between the two stations should yield very interesting results. The exposure at West Marina is excellent.

Southampton, September 16th.—Everything was, as usual, in excellent order at this station. Corporal Amos, R.E., the deputy observer, was absent on the day of my visit, and I could not, therefore, test his readings, but the observer, Mr. Cook, assured me that he had now become a very competent observer, and might be fully depended upon.

Proposed Stations of the Second Order.

Aldershot, September 17th.—I called, as requested, on Captain Ward, R.E., at the School of Ballooning, and found that he had a complete outfit of meteorological instruments, including a Fortin barometer. There is a good site available for the outdoor instruments, and I selected positions for the thermometer screen and rain-gauge. I tested the thermometers in water in the usual way, and found that the Sergeant who will have to take the observations reads accurately and can properly reduce the barometer readings.

The station, if established, should yield a valuable record, and I recommend that it be accepted.

Higham, near Rochester, September 2nd.—Mr. W. Harold Tingey having offered to establish a Station of the Second Order, I called as

arranged, to see him. I found that he has a complete set of instruments, including a Fortin barometer made by himself (which, on being verified at Kew, was found to need a correction of only ·001 inch), with a very good position for the thermometer screen and rain-gauge.

The thermometers being new, with recent Kew certificates, I did not think it necessary to test them in water. The rain-gauge was only 9 inches above ground, and was not firmly fixed; these defects I corrected.

Mr. Tingey will, I believe, make an excellent observer; and I therefore recommend that his offer be at once accepted.

Sunshine Stations.

Bournemouth, September 14th.—The recorder is placed on a wooden post which has warped, and is no longer vertical. Presumably owing to this fact, certain adjustments were required in level and for latitude. These I made, but probably further adjustments will be required as time goes on. I found that the sphere was not concentric with the bowl, it being $\frac{1}{8}$ inch nearer to the eastern than to the western side, but the instrument being one of the Negretti-Whipple pattern, I was unable, with the tools I had, to correct it.

I think the recorder is carefully attended to, but the summer cards had been used from September 1st to 8th.

Brighton, September 11th.—This instrument is firmly and well fixed on the roof of the Town Hall. It was clean and in good order, and I think is very carefully attended to. Another recorder will shortly be brought into use at the new sanatorium, on the Downs behind the town.

Emsworth, September 12th.—This instrument is at Watergate Park, five miles to the northward of Emsworth. It is fixed on a wooden post in the middle of a large field on nearly the highest ground round. It is proposed to replace the post with a brick pillar shortly. The position is a very good one. Mr. R. Christy was from home on the day of my visit, but I saw Mr. Hutty, the gardener, who has the charge of the instrument, and found him to be a very intelligent man, taking much interest in the matter.

Hastings, September 9th.—The recorder is still at the Hastings Waterworks, but owing to the erection of the manager's residence, its exposure is not so good as it was. It has been moved recently, but no position on the ground is free from objection, and I suggest, therefore, that endeavour be made to have it placed on top of the engine-house, where a very good position can be found for it.

The summer cards were still in use on the day of my visit, and the record was in consequence imperfect. I corrected this, and left particular instructions as to the dates for taking the different cards into use.

Margate, September 4th.—This instrument is well fixed, and carefully attended to. The cards, as supplied, however, are too large, and need trimming to make them fit the frame. I cut one carefully to the required size, and asked that it might be used as a pattern in future.

Southampton, September 16th.—The recorder is excellently placed on the roof of one of the main Ordnance Survey buildings. It has a good exposure, and is carefully attended to. As requested, I determined its height above the ground, and found it to be 48 feet.

Westbourne, September 12th.—The instrument in use at this station is a "Jordan" photographic recorder. It is fixed on a stone pillar, but was protected by a large glass shade. I recommended that this be removed, since the deposition of moisture on the glass must interfere to some extent with the record. I consider the exposure good, but better in summer than in winter, when the sun would be cut off about 4 o'clock.

Stations of the Third Order.

Chatham, September 2nd.—Except that the wet bulb was not sufficiently damp, I found everything in good order at this station. The barometer, however, is in a poor light, and somewhat difficult to set. I had some conversation with the observers as to the possibility of getting 9 p.m. observations, but it seems hopeless to expect these under present conditions.

Cuckfield, September 10th.—This is a rainfall station which had never been inspected. I found the gauge was in a position very convenient for access, but too much sheltered to yield a satisfactory record. I therefore selected a new position, with a much better exposure, and requested that the gauge might be shifted.

Dover, September 5th.—This is also a rainfall station which had never been inspected. The gauge is at the Dover Corporation Waterworks, on a kind of terrace on the Castle Hill. It overlooks the valley, which runs N.W. and S.E., and is about 140 feet below the top of the hill.

The position is good, but I suggested that the gauge be moved about 12 feet, to avoid possible interference by the growth of trees. It was promised this should be done, and also that the gauge, which was loose, should be firmly fixed.

Fredville, September 5th.—This is another new rainfall station. The observer, Mr. H. W. Plumptre, was from home, but I saw his father, Colonel Plumptre. The gauge is exposed in the kitchen garden, and when I saw it, it was much sheltered by a high row of beans. In its present position it will always be liable to be protected by high crops, and I therefore advised its removal to another position, which I selected, where it will have a better exposure. It is at present 2 feet above the ground, and I think this height should be maintained. The gauge was not circular, but this I was able to correct.

Kearsney, September 4th.—The rain-gauge at this station had been shifted to a new position, selected for it on the last inspection. The new position is, I think, the best available, but some bushes near, having grown much, need to be removed. This it was promised should be done at once, and others kept cut back. The gauge was loose, but I was assured this should be rectified.

Sandgate, September 7th.—The rain-gauge is exposed on a terrace in the cliff, at perhaps 100 yards distance from the sea, and at the level of the tops of the houses in the High Street. At about 40 yards from the gauge there are some houses 45 feet high, immediately behind which rises the cliff. The position is probably the best available, and I think the results will correctly represent the rainfall for the town. The instrument was clean and in good order.

I append the usual tables of instrumental corrections.

Barometers.

Results of Comparisons with the Inspector's Standard, Adie B.T. No. 789.

Stations.	Observer's reading compared with Inspector's.	Correction to reduce to Inspector's Standard.
Telegraphic Reporting Stations.		
	in.	in.
Dungeness	−·002	+·014
Hurst Castle	+·002	+·019
North Foreland	−·002	—
Stations of the Second Order.		
Aldershot	—	—
Bramley	+·001	+·009
Chatham	·000	+·013
Eastbourne	·000	+·007
Epsom	−·005	+·009
Parkstone	−·001	−·011
St. Leonards	−·002	+·033
Southampton	−·001	+·014

Thermometers.

Results of Comparisons with the Inspector's Standard No. 4569.

Stations.	Correction to be applied to readings of						Remarks.
	Dry Bulb.	Wet Bulb.	Maximum.	Minimum.	Grass.	Spare.	
Telegraphic Reporting Stations.							
	°	°	°	°	°	°	
Dungeness	−0·4	−0·3	−0·3	−0·1	—	—	
Hurst Castle	−0·5	+0·2	−0·5	−0·2	—	—	
North Foreland	−0·8	−0·3	+0·1	0·0	—	−0·4	Observer has been applying + 1·0 to readings of maximum.
Station of the Second Order.							
Aldershot	−0·4	−0·1	−0·3	−0·1	−0·1	—	Long bulb therm.−0·2.
Bramley	+0·1	+0·1	+0·3	+1·1	+3·1	—	
Chatham	−0·4	−0·4	0·0	+0·2	—	—	Solar rays max.−0·2.
Eastbourne	0·0	0·0	−0·1	+0·1	—	—	
Epsom	−0·3	+0·1	+0·1	+0·1	—	—	
Parkstone	−0·2	−0·1	0·0	−0·1	0·0	—	
St. Leonards	−0·4	−0·5	+0·1	+0·1	—	—	Earth therm.−0·3.
Southampton	−0·6	−0·2	−0·9	+0·1	+0·1	—	

(Signed) John A. Curtis.

Inspection of Observatories and Anemographs by the Staff of Kew Observatory.

Glasgow Observatory, visited September 15th–17th.—Since last year's inspection Professor Becker has had a light iron staging fitted to the upper part of the anemometer support, which greatly facilitates the examination of the instrument.

The external parts of the anemometers were examined, and I found that all the bearings were well lubricated, and that the asbestos oil in the direction-well was in very good condition. I thus did not think it necessary to remove it, especially as the sperm oil purchased by the Meteorological Council had not arrived, though this was one of the places selected for its trial during 1896–7.

The cup arms and fans showed no perceptible signs of wear.

After oiling the recording parts and clock, the orientation was tested and found correct.

The rain-gauge was examined, and a Richard pen fitted in place of the ordinary lead pencil which had hitherto been in use. The observer was instructed in its manipulation, and also requested to revolve the cylinder for a zero line, and to make a distinctive mark at the beginning and ending of trace.

The thermograph clock was taken to pieces and cleaned, and a new line fitted to the weight, but the barograph clock only required oiling. All other parts of these instruments were examined, and the mirrors and lenses wiped. In the case of the thermograph I noticed that the dry and wet dots were not exactly one over the other; this was corrected before starting the instrument.

The observer's attention was called to the muslin and threads on the wet-bulb thermometers, which were rather soiled.

The values of the zero lines are as follows:—

Upper zero line, dry	82°·7
„ „ wet	84·8
Lower zero line, dry	12·1
„ „ wet	8·7

The scale values are:—

For dry bulb	10° = 0·634 inch.
For wet bulb	10° = 0·602 „
Barograph	1 inch = 1·551 „

A comparison of the various thermometers was made in water at a temperature of 52° Faht. with the Kew standard, No. 720, and the following corrections determined:—

	°
Dry bulb, No. 708	−0·1
Wet „ „ 711	−0·1
Maximum, No. 58,846	0·0
Minimum, „ 63,942	0·0
Grass minimum, No. 59003	0·0
Barograph thermometer, no number	−0·8

Fort William, September 18th–20th.—All the instruments here were found in good working order, but I dismounted and cleaned both the barograph and thermograph clocks, and attached new cords to the weights as well as to the winding barrels. Also the lenses, condensers, and mirrors received due attention.

As regards the photography, the intensity of the traces was much improved after the lenses, &c. had been cleaned, the sheets taken off

and developed on the 20th being quite equal to the curves obtained at the other observatories.

The values of the zero lines are as follows :—

Upper zero line, dry	79°·3
„ „ wet	77·5
Lower zero line, dry	16·0
„ „ wet	17·4

The scale values are:—

For dry bulb	10° = 0·670 inch.
For wet bulb	10° = 0·695 „
Barograph	1 inch = 1·542 „

The thermometers were compared with the Kew standard, No. 720, and found to have the following corrections at 58° Faht. :—

Dry bulb, No. 671	0°·0
Wet „ No. 672	−0·2
Maximum, No. 1092	+0·1
Minimum, No. 1322	+0·8
Barograph thermometer, No. 690	−2·1
Attached thermometer (to Standard barometer), No. 72,222	−0·3

Note.—As the correction to the minimum thermometer was rather large I heated the chamber end over a lamp, and, after standing the tube for some time in a vertical position, determined the following correction :—

Minimum, No. 1322	+0°·5

The self-recording rain-gauge was examined and the clock oiled, after which a Richard pen was fitted to the instrument in place of the ordinary lead pencil. Mr. Rankin was instructed in its manipulation, and asked to mark the paper at the beginning and end of the trace, and also to revolve the cylinder for a zero line.

As a good deal of rain fell subsequent to starting the gauge, an excellent opportunity was afforded of testing the action of the pen. The curve which came off on the following morning showed the marking to be quite satisfactory.

Deerness, Orkney, September 23rd–25th.—Owing to the inclemency of the weather it was useless to attempt to inspect the anemometer at Deerness on September 23rd, as previously arranged by letter with Mr. Spence. Fortunately there was an improvement on the following day, so that I was able to drive over from Kirkwall and dismount the instrument.

The anemometer was found to be in excellent order, and, as usual, is well attended to. I carefully examined the external parts, and found that the cup, arms, and fans were in good condition. All parts were well lubricated, but the asbestos oil in the direction-bearing was not satisfactory, having become thick and somewhat sticky at the bottom of the reservoir. This I had thoroughly cleaned out and filled with the new sperm oil which had been sent from the Meteorological Office.

The cup at the top of the velocity spindle was also filled with sperm oil, and the other bearings lubricated in the same way. I took the opportunity of fitting a new screw to the oil hole of velocity shaft in place of a wooden plug which had been temporarily used.

The clock was oiled and the registering apparatus generally cleaned.

Afterwards the orientation was tested. At times a slight kink is seen in the velocity trace; this is due to the back-leash existing between the cylinder and clock, but I was afraid to gear up the wheels too tightly for fear of stopping the clock.

Mr. Spence informed me that he estimates the force of the wind according to the Beaufort scale from the anemometer curves.

Aberdeen, September 29th–October 1st.—At this observatory all the instruments were working satisfactorily, and the photography was good. The barograph and thermograph had their clocks, lenses, condensers, and mirrors generally cleaned. In the thermograph the dots of light were not quite vertically over one another; this was rectified, and I attempted to widen the distance between the dry and wet traces, but was not successful, as the metal fittings and screws for this adjustment had become so corroded that I was afraid of using too much force, there being considerable risk of breaking the thermograph tube itself.

The values of the zero lines are—

Upper zero line, dry	81°·4
„ „ wet	79·3
Lower zero line, dry	23·0
„ „ wet	15·8

The scale values are—

For dry bulb (summer)	10° = 0·719 inch.
„ „ (winter)	10° = 0·761 „
„ wet-bulb	10° = 0·700 „
Barograph	1 inch = 1·573 „

From a comparison of the various thermometers in water at 50° with the Kew standard, No. 720, the following corrections were determined:—

Dry bulb, No. 397	—0°·1
Wet „ 395	—0·6
Maximum, No. 1002	+0·1
Minimum, No. 5056	+0·1
Barograph thermometer (no number)	—2·2
Attached thermometer to the standard barometer, No. 71061	—0·1

The anemometer was inspected and found to be well lubricated, the oil in the direction reservoir and velocity cup being in excellent condition. After cleaning the instrument, the various parts were supplied with fresh sperm oil, obtained locally by Mr. Boswell, who informed me that sperm oil with just a dash of paraffin had been used for some years past for the anemometer, and found to answer in every way satisfactorily.

The orientation was duly tested and found correct.

I had the rain-gauge dismounted and oiled, and regulated the clock. A Richard pen was fitted in place of the ordinary lead pencil, and water run through the receiver at intervals to test the pen's action in marking the paper, which was found satisfactory.

The observer was instructed to mark the paper at the beginning and ending of the trace.

Alnwick, October 2nd–3rd.—I visited Alnwick Castle on October 2nd by appointment with H. J. Willyams, Esquire. The anemometer was found in good order and well oiled. This is regularly performed by the resident mechanic, under the direction of Mr. Revall, the architect, who takes a great interest in the working of the instrument.

The registering apparatus was also satisfactory, but I oiled the clutches of both the direction and velocity pencils, as well as the escape wheel of the clock. I did not, however, take the clock to pieces, as it had only quite recently been cleaned by the local watchmaker.

The orientation was examined.

North Shields, October 5th–6th.—The anemograph at this station was found in good action, and is evidently well attended to.

On dismounting the instruments I found everything satisfactory, excepting that the worm of the direction spindle, referred to in Mr. Constable's report of last year, is in a very bad state. I would, therefore, suggest that Captain Harrison be requested to send the direction fans, with the spindle and nuts and *lignum vitæ* bearings, to Mr. Munro for repair. When finished, the mechanic who periodically oils the instrument could quite well remount the fans, &c., as the orientation adjustment will not have been interfered with.

The external parts were cleaned, and the different bearings supplied with fresh asbestos oil. Also the recording apparatus was attended to, and the clock oiled, after which the orientation was examined and found correct.

Yarmouth, October 8th–10th.—Unfortunately the weather on the first day of my visit here was so stormy that it was practically impossible to dismount the exposed parts of the anemometer, but I examined and cleaned the registering apparatus, and oiled the clock.

Mr. Watson called my attention to the action of the velocity cups, which were vibrating a good deal, and also to a grinding noise which could be heard at intervals during their rotation. Fortunately the gale abated during the day, and Friday (October 9th) turned out fine, so that I was able to get the instrument down.

The bearings were well lubricated, with the exception of the velocity cup bearing, which had run quite dry. On examining the velocity shaft, I found that the lower bearing upon which the spindle rests had become worn down on one side, and also that one of the nuts securing the cups to the shaft was loose, which I think would account for the vibration and grinding noise referred to by Mr. Watson.

It was undesirable to remount the instrument in such a condition, so, acting upon telegraphic authority from the Meteorological Office, I sent up the lower bearing of the cup spindle, and also the worm end of the shaft, to Mr. Munro, requesting him to carry out the repairs as early as possible.

I then examined and cleaned the direction part of the apparatus, and oiled the bearings with fresh asbestos lubricant. After adjusting and examining the orientation, which was found correct, the instrument was started for the registration of direction only.

As Mr. Watson did not care to undertake the responsibility of fitting up the repaired portions of the velocity shaft, I revisited Yarmouth on October 20th, and found that, in the meantime, the cups, &c., had been painted, and a new step-ladder placed on the roof of the Sailor's Home, by means of which access is gained to the external parts of the instrument. The repaired portions were duly fitted together, and the anemometer was finally started about 4 p.m., and the sheet which came

off on the morning of October 21st showed that everything was satisfactory.

(Signed) T. W. Baker.

Holyhead, August 11th–13th.—All three different anemometers at this station were examined.

The *Robinson* was in good order, and apparently well looked after. It was dismounted and cleaned, and the asbestos lubricant, which was found to be clean and fluid, was removed and replaced with sperm oil recently supplied by the Meteorological Office.

Before disturbing the instrument I checked the orientation, and found it satisfactory, and the markings are on anemograph curve No. 224. This was repeated after the inspection, and this set of lines will be found on curve No. 225.

The advantage of frequent examination of the orientation was pointed out, and it was promised that it should be done more regularly in future.

Dines' Pressure-tube Anemometer.—The recording and interior parts of this instrument were dismounted and examined. The water was clean, but there was a whitish deposit on every joint of the float, about $\frac{1}{8}$ inch thick on the bottom of the water vessel and on upper part of brass collar at bottom of float, and was found more or less all over the metal surfaces.

This deposit was not gritty, crumbled when touched, and was black on the under side in contact with the metal surface, and I think it may have been caused by the water acting chemically on the *flux* where it had exuded from the tinned joints in the copper, and, if so caused, will probably not be found again, or only in a much smaller degree when float is next examined.

It was all removed, and every part of float, water-vessel, tube, &c., thoroughly and carefully cleaned, fresh water put in, and all left in good order.

Mr. Davis, who attends to the anemometers—under the direction of Mr. Cotton—being of opinion that the vane still "hung" in light winds (which was confirmed by my own observation), a long ladder and ropes were procured, and Mr. Davis at some risk reached the top and took off the vane-piece.

The inside of vane and the tube on which it slides was wet, and had a thin greenish covering; this was cleaned off, and vane replaced, and it is now much livelier in light airs.

Mr. Cotton suggests, as a means to prevent this "hanging," that the present vane tube should be enlarged throughout its length, and be fitted with a narrow collar (about three sixteenths of an inch) of same interior diameter as present tube, at upper and lower ends, so as to make the necessary almost air-tight fitting, but to prevent the whole surface of tube acting as a bearing when covered with any deposit.

As regards the occasional faint trace, the observer states that this is now much less frequent, since he recently ceased to dilute the ink with water.

He has a small shallow water-dish inside cylinder cover to keep air moist.

Bridled Anemometer.—The cup-spindle was dismounted and examined, and two cups—Nos. 1 and 4, counting from finial—were found to be pierced through, presumably by stones thrown by boys. These holes I had soldered up, and the concave surfaces hammered out again.

The cups, spindle, and base need painting, and I asked Mr. Cotton to have this done (and at same time to have a coat of paint put on the Robinson fans).

The friction balls in the exterior platform, carrying the cup-spindle, were dirty and sticky, and the oil rather viscid, and those in the bearing just under roof (which are very difficult to get at) were the same. They were washed in paraffin and freshly lubricated with sperm, and left in good order.

The interior and recording parts seem to be carefully attended to. and appeared to be working satisfactorily.

The present good ink traces are not obtained from the gold pen with iridium point, supplied last March, but from Mr. Curtis' fountain pen, with the addition of a small damper at end of tongue to retard flow of ink.

Stonyhurst, August 14th and 15th.—The barograph and thermograph were in good order, but both clocks required cleaning, and they were accordingly taken to pieces and cleaned.

The crutch of each clock was rusted.

The air-hole of barograph was looked to and found clear.

There has been considerable difficulty with the gas supply, owing to faulty pipes, but the laying of a new main to observatory is now seriously contemplated, and if this can be carried out it is hoped that future loss of trace and faint curves will be prevented. I suggested some minor changes in photographic procedure, which will tend, I hope, to improve the density of the curves.

Anemometer.—The recording part was in excellent condition, and required but slight attention, but the exterior certainly needed overhauling, and was entirely dismounted.

The lubricant (local sperm and paraffin) used for the direction rollers was fluid, but dirty, and had quite dried up in the oil-cup at top of velocity shaft. All parts were thoroughly washed in paraffin and lubricated with fresh sperm.

I pointed out to Rev. Father Sidgreaves the advantage of having an oiling-hole drilled through cover immediately over the worm on fan-axle, as without this it is not easy to keep worm properly oiled, and, in fact, that was dry and rather rusty.

It was promised that this should be done at earliest opportunity, and worm and teeth lubricated at frequent intervals. The orientation was duly checked.

Rain-gauge.—On inspecting the working I found there was too much friction with the pencil employed, which hampered the free action of the float, and this is shown on several curves. The pencil was removed, and a "Richard" pen fitted to replace it, also a little mercury taken out to improve freedom of float, and the working then showed considerable improvement.

The clock was cleaned, and "discharger" examined, and water was then run into the gauge from a filter, and a series of ink traces obtained, which were very satisfactory.

The observer was instructed in the manipulation of the pen, and his notice especially called to the necessity of using the least possible pressure of pen on paper—practically only a mere contact being required.

The following are the corrections required by the thermometers in use in the "Thermograph" screen, obtained by comparison with Kew standard thermometer, No. 720, at 55°:—

Dry standard, 619 - - -	—0°·1
Wet „ 382 - - - -	—0·4
Maximum, M.O. 1525 - - -	0·0
Minimum, B.T. 501 - - - -	+0·2

and corrections to thermometers in "Stevenson" screen are:—

Dry bulb, 553 - - - -	—0°·3
Wet „ 555 - - - -	—0·4
Maximum, 7310 - - -	—0·5
Minimum, 48587 - - - -	0·0
Grass minimum, 81514 - - -	+0·1

Fleetwood, August 17th–18th.—The anemometer here seemed to be working satisfactorily, but examination showed that it would be improved by cleaning, &c., and it was accordingly dismounted and overhauled. The oil was fluid but rather dirty, and there was a considerable deposit in the direction-rollers sink; this was removed, all left clean, and the old oil replaced with fresh asbestos lubricant.

The pin holding the velocity shafting under platform was very loose, and had almost worked out; this was put right.

Careful drawings were made of the *lignum vitæ* bearings, asked for by Mr. Munro, and were forwarded by Mr. Gaulter, and the shoulders were then lowered a little to improve action.

There is considerable "play" between the worm or fan-axle and the teeth of the fixed tooth-wheel.

The clock and recording parts received necessary attention, and the clock pendulum, which had got "out of beat," was corrected.

I checked the orientation before dismounting instrument, and it seemed satisfactory.

The advantage of regular testing of the orientation was pointed out, and in future endeavours will be made to have it done at more frequent intervals. Mr. Gaulter checked it with me on morning of 18th, and these lines are on the anemograph curve for that date.

Armagh, August 19th and 20th.—The anemometer was dismounted and cleaned. The oiling seems to be regularly done, and the asbestos lubricant was clean and fluid.

As this is a station selected for trial of the new sperm oil this year, I removed the old lubricant, and replaced it with the sperm. It is worth noting that the oil here was entirely free from the deposit found at Fleetwood, although precisely the same kind of oil.

The bottom spiral of worm at base of cup-spindle, taking into reducing gear, was bent up; this was put right. It may, perhaps, have affected results in low velocities.

The velocity pencil marks faintly in low winds, and this seems a fault peculiar to this particular anemometer, for, although endeavours were made by cleaning, re-adjustment of counterpoise, &c. to improve it, I am afraid it is but very slightly the better. The direction-spiral is not exactly true, the pencil not describing a straight line during a revolution. Orientation tested and was satisfactory.

Several trees to west and north of observatory have been topped, but there are others on neighbouring estate which will, ere long, influence anemometer.

The rain-gauge received due attention, the new "Richard" pen was fitted to it, and instructions given in its manipulation, and a series of artificial discharges obtained.

The "Willesden" papers having arrived, a fresh start was made on August 20th with the pen and "Willesden" sheets.

The hedge to north of gauge is too high, but Dr. Dreyer stated that it would be cut at an early date.

Dublin, Mountjoy Barracks, August 21st–22nd.—The officer now in command here is Major Hellard, R.E. Before inspecting anemometer I examined some curves, and went into the question of the very faint traces which occurred at this station. Corporal Stone, who has had the care of the instrument for some years, is strongly of opinion that it is due to damp, and states that in wet weather the sheets stretch considerably, although every endeavour is made to keep cylinder case, pencils, &c. as dry as possible, but as in this particular type of anemometer the recording portion is necessarily very much exposed, the defect of faint traces at times cannot very well be overcome, except, perhaps, by the adoption of silver helices, as at Scilly.

The balls and the lubricant (local oil) in direction bearings were rather gummy; all parts were cleaned and replenished with asbestos lubricant.

The vane appeared fairly active, but seemed better after the examination.

Clocks, &c., were taken to pieces, oiled, and left in good order.

Orientation was satisfactory. Dublin time is kept at this station.

Valencia, August 25th–28th.—All the recording instruments here evidently receive regular care and attention.

The clocks of barograph and thermograph were cleaned and left in good order, but I found next morning that the barograph light shutter had not acted after midnight.

No cause could be discovered for this failure, but I revolved barrel many times both by hand and by clock, and the shutter dropped each time clean and sharp, and has subsequently worked satisfactorily.

The "air-hole" was examined and found quite clear.

The Inspector last year experienced considerable difficulty with the thermograph clock, and this year its beat had again become faint and irregular, but the crutch shaft is made of very poor steel, and its permanent adjustment to a regular beat is difficult and troublesome, but I managed to considerably improve it, at least for the present.

The *Raingauge* received necessary attention, and some paraffin was floated over the mercury. The new pen was fitted up, and instructions given in its usage, and water run through for a set of discharge traces.

The *Anemometer* was dismounted and cleaned.

The fans are showing evident signs of wear, and are badly corroded, but Mr. Cullum informed me that the provision of new ones has been decided upon.

The oil was found to be clean and fluid, and would have done for some time longer, but I thought it best to have it removed and replaced with fresh asbestos lubricant.

The orientation was duly checked and found satisfactory.

The recording parts of the instrument are in excellent condition, but it would be well if Mr. Cullum was authorised to have the present poor pins in the shafting removed, and holes drilled through the tubes and clinch pins fitted in them, because the plugs now in use are very liable to work out of their shallow holes during gales.

This would not be a long job, and would be an improvement on the present arrangement, especially with the *direction* shafting, to which this suggestion more particularly refers.

The thermometers were compared with Kew standard No. 720, at 55°, and the following found to be the corrections required:—

Dry standard, No. 399	-0°·6
Wet „ „ 473	−0·4
Maximum, M.O. 1003	0·0
Minmum, „ 2497	+0·5

The *plus* correction to the minimum seemed rather large, so I thoroughly heated chamber and placed tube in a vertical position for some time, and a subsequent comparison with the Kew standard gave the required correction as +0·1.

Falmouth, August 31st–September 3rd.—The instruments at this observatory were in their usual satisfactory condition. There was nothing in either barograph or thermograph calling for special remark, but both clocks were cleaned and oiled, and the lenses carefully wiped.

The anemometer was dismounted and examined.

Three of the blades on the fans were loose; these I had strongly soldered.

The worm on fan axle is becoming worn, causing considerable "back-leash."

The lubricant for direction-roller bearings was fluid, but there was a reddish deposit, which may have been caused by rust, due, perhaps, to water driving in between edge of toothed platform and the revolving cover.

The rollers were working rather stiffly; they were well cleaned, screws slightly eased, and left running freely.

The asbestos lubricant was removed, and replaced with sperm recently supplied by the Meteorological Office.

Clock and recording parts were duly cleaned and examined, and the orientation checked.

Since my last visit (1894) there has been considerable building activity in the neighbourhood of the observatory, and the ground to east and south-east is now well covered (the nearest building being about 140 feet distant), but the exposure in other quarters is still good, and has not been interfered with. I was informed that negotiations have been carried on with the ground landlord, with the satisfactory result that the present building limit is not to be exceeded, and no other houses erected nearer than those now in course of erection.

The rain-gauge clock, &c. was cleaned.

The pencil was removed, and the new pen substituted, but the alteration brought the shifting fitting for the pen beyond the action of the clamping screw, when made to mark on the zero-line of the sheet, and the action of the float being also a shade sluggish at the extremity of its drop, pointed to the need of additional mercury in the cistern. This we managed to procure, and it was added to gauge at changing time next morning (September 3), and rendered the action buoyant and satisfactory. The necessary instruction in manipulating the pen was given to the observer.

The thermometers in use were compared with Kew standard No. 720, at 56°, and found to require the following corrections :—

Dry bulb, No. 383 - - - -	°−0·5
Wet „ No. 388 - - - -	−0·3
Maximum, No. 104 - - -	−0·4
Minimum, No. 308 - - - -	+0·2
Thermometer attached to barometer, Adie 1240 -	−0·9

After the comparison, the minimum tube was heated, and placed vertical for some time, and subsequent determination gave the correction as 0·0.

Oxford, October 29th.—The meteorological instruments were in their usual satisfactory condition.

The barograph and thermograph did not require cleaning, this having been done very recently, and both the photography and the definition of curves are very good.

The anemometer is kept well lubricated, but the old asbestoline in the direction-roller bearings had become thick and dirty. The greater portion was removed, and replaced with sperm and paraffin, and the working of the vane improved.

The orientation was examined and found good.

The rain-gauge was furnished with a pen, in lieu of the pencil hitherto used, and water was run into gauge through an aspirator-tube, and a series of discharges obtained which gave very satisfactory ink traces.

The clock pallets, &c., were oiled.

The various thermometers were compared with Kew standard No. 720, and the following found to be the corrections required, agreeing closely with those applied at the Observatory :—

Dry-bulb thermometer, No. 576, in thermograph screen -	°−0·15
Wet-bulb „ „ 575 „ „ -	−0·20
Dry-bulb „ B.T. 1710, in Stevenson screen -	−0·25
Wet-bulb „ „ 1709 „ „ -	−0·15
Maximum „ M.O. 356 „ „ -	−0·40
Minimum „ „ 363 „ „ -	+0·15
Grass minimum thermometer, 70852 - - -	+0·25
Old grass minimum thermometer, 2221 - - -	+3·30

(Signed) E. G. Constable.

APPENDIX VI.

Method of Dealing with Telegraphic Weather Intelligence.

The operations connected with the preparation and issue of the Forecasts and Storm Warnings have not undergone any material change. Full details will be found in Appendix X. to the Report for 1891.

Daily Weather Report.

The Office receives, when the telegraphic communications are perfect, sixty reports each morning, eighteen each afternoon (except on Sundays), and twenty-nine each evening, the arrangement of which is explained in the Annual Reports for recent years.

The change made in the Daily Weather Report during 1894, by the insertion of Reports from the Azores (forwarded by the courtesy of the Portuguese Meteorological Authorities), is still in force. The Report fills four large quarto pages, as it has for several years past.

The standing portions (maps, &c.) are printed in blue, and the information for each day is in black.

The Monthly "Correction and Addition List" is published as before.

The subscription for the Report is—

For delivery by hand, where feasible, £2 *per annum;*
„ *by book post* £1 „

An early issue of MS. copies of the observations and remarks is supplied to some applicants at the rate of 2*l.* 10*s.* per annum. Arrangements can also be made for the supply of charts drawn from the 8h. a.m. or 6h. p.m. observations, such as appear in the "Times."

Weekly Weather Report.

The Weekly Weather Report, which has appeared since February 1878, and was re-arranged at the commencement of 1890, is prepared for the calendar week, Sunday to Saturday. It is published regularly on Thursdays, and is illustrated by three maps for each day, which, like the Daily Reports, show the outline of the land and sea in blue, while the information is in black. The maps show (1) for 8 a.m., the temperature, weather, and sea disturbance; and (2) for 8 a.m. and 6 p.m., the distribution of pressure, the winds, over, and on the coasts of, Europe, and the sea disturbance when considerable. The information on the first and second pages of each report consists of observations of Temperature and Rainfall made at 78 stations, the individual values for which are given on the second page of the Report. Sunshine records taken at 50 stations are given on pages 2 and 6.

Tables of *Accumulated Temperature*, designed to give persons engaged in agriculture better means of estimating the manner in which vegetation is affected by temperature than that afforded by the more usual methods of treating the readings of the thermometer, are still published on the first and second pages, and show for each week, and for the whole period from the beginning of the year, the weekly and progressive values respectively, of the combined amount and duration of the excess or defect of the air temperature, above or below a suitably fixed standard, or *base temperature*. The base value adopted is 42° Fahr.

Accumulated Temperature is expressed in *Day-degrees;* a Day-degree signifying 1° F. of excess or defect of temperature above or below the base (42° F.) continued for 24 hours, or any other number of degrees for an inversely proportional number of hours.

The following are the rules for computing, for a weekly period, from the observed maxima and minima, the accumulated temperature above or below 42° F.:—

1. Obtain the mean temperature, from the means of the seven observed maxima and minima, suitably corrected for non-periodic changes of temperature.

2. In obtaining the accumulated temperature four cases may occur, to which the following rules will apply:—

Conditions of Temperature.	To obtain the daily Accumulated Temperature	
	Above 42° F.	Below 42° F.
If the minimum is *above* 42° F. or *equal* to 42° F.	Subtract 42° F. from the mean.	There is none.
If the minimum is *below* 42° F., but the mean for the day is *above* 42° F.	From the difference between the mean for the day and the minimum deduct the accumulated temperature below 42° F., calculated as stated in the next column.	The required quantity is the excess of 42° F. over the minimum, multiplied by the coefficient 0·4.
If the mean for the day is *below* 42° F., but the maximum is *above* 42° F.	The required quantity is the excess of the maximum over 42° F., multiplied by the coefficient 0·4.	From the difference between the mean for the day and the minimum deduct the accumulated temperature above 42° F., calculated as stated in the preceding column.
If the maximum is *below* 42° F., or *equal* to 42° F.	There is none.	Subtract the mean from 42° F.

In each of the above cases the result will be the *average daily* value, and must be multiplied by 7 in order to obtain the value for the whole week.

The coefficient varies with the duration of the period, and also with the base temperature.

The coefficient given above, in Rules 2 and 3, is for a weekly period, and for the base temperature 42° F. The following are its values for other base temperatures,—for 32° F., 0·4; for 52° F., 0·33; for 62° F., 0·25.*

In addition to the reports from the Telegraphic Reporting Stations, and the returns from certain self-recording Observatories, weekly schedules from 56 voluntcer observers are used, the names of the stations and observers being given in Appendix XI., p. 76.

An early copy of the MS. of the report is prepared on Tuesday in every week, and the summary on its first page is sent to several papers on that evening; the printed copies of the complete report are ready for sale on Thursday afternoon.

* A full explanation of the principles on which these rules are based will be found in Appendix II. to the Quarterly Weather Report for 1878.

Appendices, &c. to the Weekly Weather Reports.

Two Appendices, I. and II., have appeared, similar to those for several recent years. The Monthly Summary Supplement gives the average values for Pressure, Temperature, Rainfall, and Bright Sunshine of the current month, and the difference between these values and the means for the corresponding months in a long series of years, together with the number of days on which rain, snow, hail, thunder &c., &c. occurred, and the number of days on which the wind blew from the eight principal points of the compass.

For the Weekly Weather Report 1896, the following information has been completed and issued :—

Appendix III.—Showing for each District, during each of the three Lustra and the whole period comprehended in the 15 years, 1881–95—the mean values for each week, for Rainfall, Accumulated Heat, and Bright Sunshine.

Appendix IV.—Showing for the same Districts and period the Mean Temperature of the Air for each week.

In the *Preface* three important Tables have been included, showing for each Station for each of the calendar months and for the whole year :—

1. The Means of Temperature—Minima, Daily, and Maxima, for the 25 years, 1871–95.
2. Rainfall in inches, for the 30 years, 1866–95.
3. Bright sunshine (number of hours recorded and per-centage of possible duration), for the 15 years, 1881–95.

Issue of Forecasts.

Remarks on the actual state of the weather, and Forecasts *for not more than one day in advance*, are prepared at the Meteorological Office as under :—

*On Week Days.**

(1.) At 11 a.m. (from the morning reports), for the 24 hours ending at Noon on the day following the date of issue. These are intended especially for the early editions of the evening papers, for the clubs, and for exhibition at certain selected stations (see page 10).

(2.) At 3.30 p.m. (from the morning and afternoon reports), for the day following that of issue. This set of forecasts is supplied to a few newspapers and a copy is exhibited regularly at the door of the Meteorological Office. During the Hay Harvest they are telegraphed to about 28 well-known agriculturists, to be made known in their neighbourhoods (see p. 12).

(3.) At 8.30 p.m. (from the 8 a.m., 2 p.m., and 6 p.m. reports), for the civil day following that of issue. These are supplied gratis to any newspaper or news agency which may apply for them, and send for them regularly. A very large number of the more important papers and news agencies avail themselves of this advantage.

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* Good Friday, Christmas Day, and Bank Holidays are reckoned as Sundays.

The forecasts are made for the following districts :—

0. Scotland, North.
1. Scotland, East.
2. England, N.E.
3. England, East.
4. Midland Counties.
5. England, South (and English Channel).
6. Scotland, West (with Isle of Man).
7. England, N.W. (with North Wales).
8. England, S.W. (with South Wales).
9. Ireland, North.
10. Ireland, South.

The remarks and forecasts are posted at the doors of the Meteorological Office, 63, Victoria Street, S.W., on week days,* for the inspection of the public. Copies, or extracts from them, are communicated under the conditions stated below, but no information which is not substantially included in them can be supplied.

A series of boards is exhibited on the front of the Office showing in large type the state of the wind, weather, and sea disturbance at six stations, situated on our S.E., S., and W. coasts. The stations selected are Yarmouth, Dungeness, The Needles, Scilly, Holyhead, and Valencia (Ireland), and the observations posted up are those for 8 a.m. and 2 p.m. daily, except on Sundays,* the boards being changed at about 9h. 45m. a.m. and 3h. p.m. The information can be easily read from the street.

Forecasts for Subscribers.—Any person can be supplied with a copy of the Forecasts, once on each week day,* on payment of a subscription of ten shillings per annum, or 2*s.* 6*d.* per official quarter, or any part thereof, *in addition to the cost of transmission;* the charges will therefore be, by *letter* post, 9*s.*, by *book* post, 5*s.* 9*d.*, per quarter.

The forecasts for any individual district and for any of the hours mentioned above can be forwarded daily, on payment of 3*d.* per day for any definite period, in addition to the cost of transmission.

Forecasts for Clubs.—These are drawn up at 11 a.m., for all the districts, and are supplied to Clubs, for a subscription of ten shillings per annum. They are delivered by hand to Clubs situated in or near Pall Mall. Special arrangements can be made for delivery at a greater distance by hand or by post.

Forecasts for Hay and Corn Harvests, or for Public Use.—Special facilities are offered for the transmission of Forecasts for these purposes, a nominal fee of 2*s.* 6*d.* being charged for an official quarter or any part thereof, in addition to the cost of the telegrams.

Exhibition of Telegraphic Forecasts at Local Post Offices.—The Post Office has sanctioned the exhibition of Forecasts at Local Post Offices, provided space is available, if the persons to whom they are addressed desire them to be so exhibited instead of being delivered to themselves.

Unless otherwise arranged, all forecasts transmitted by post are sent by book post, not as letters.

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* Good Friday, Christmas Day, and Bank Holidays are reckoned as Sundays.

Inquiries as to the Weather.

Inquiries Personally or by Messenger.—Any person applying at the Meteorological Office between 11 a.m. and 8 p.m. on week days, and between 7 p.m. and 8 p.m. on Sundays,* can be supplied, in writing, with the latest information in the possession of the Office, with regard to the weather in any district,or the latest forecast issued for any specified district, on payment of one shilling for each inquiry.

Inquiries by Letter.—Application may be made by letter, enclosing thirteen pence in stamps if the reply is to be *by post*, and one shilling in stamps, *in addition to the cost of the reply* (consisting of ten words, exclusive of the address) if the reply is to be *by telegraph*.

Inquiries by Telegraph.—Any person may obtain *by telegraph* from the Meteorological Office the latest information as to the weather in, or the latest forecast for any district of the United Kingdom by payment of a fee of one shilling *in addition to the cost of a telegram and reply to any post office*. The telegram containing the inquiry must be addressed as follows:

To

Weather,

London.

The payment for the reply should be for at least ten words in addition to the address.

Application may also be made for similar information to be sent either *by telegraph* or *post* on any future specified day.

Checking of Forecasts and Storm Warnings.

The forecasts and storm warnings issued by the Office are carefully checked by being compared with the conditions actually experienced during the time to which they refer. The method adopted was fully explained in the Annual Report for 1891, and the results for 1896 will be found on pp. 14 and 15.

In order to render the information in the possession of the Office as to the weather experienced on our coasts still more complete, the Council have, as in preceding years, obtained from the various Lighthouse Boards the original log-books from some of the most exposed light-ships and lighthouses. They again express their cordial thanks for the co-operation so readily granted to them by these Boards.

* Good Friday, Christmas Day, and Bank Holidays are reckoned as Sundays.

APPENDIX VII.

Report on the Comparison of the Forecasts issued at 8h. 30m. p.m. with the Weather subsequently experienced, for the 12 Months, April 1896 to March 1897. The results are for the United Kingdom as a whole.

The letters used have the following signification:—

a = complete success. | **c** = partial failure.
b = partial (more than half) success. | **d** = complete failure.

The checking has been conducted on the same system as that employed in previous years, *i.e.*, each forecast has been considered under the separate headings of "Wind" and "Weather," but the results of the 8.30 p.m. Forecasts only are here published.

The first column gives the per-centage of success in "Wind," the second in "Weather," and the third the average of the other two.

The Summary for the various districts is given at page 11.

Months.		Per-centages. Wind.	Weather.	Average.	a + b.
April	a	54	54	54	85
	b	32	30	31	
	c	13	6	10	
	d	1	10	5	
May	a	57	74	66	84
	b	25	12	18	
	c	16	6	11	
	d	2	8	5	
June	a	59	67	63	84
	b	22	19	21	
	c	15	10	12	
	d	4	4	4	
July	a	51	64	58	79
	b	22	21	21	
	c	20	9	15	
	d	7	6	6	
August	a	55	66	61	82
	b	23	20	21	
	c	15	11	13	
	d	7	3	5	
September	a	33	62	48	81
	b	40	27	33	
	c	17	9	13	
	d	10	2	6	
October	a	54	67	61	86
	b	28	22	25	
	c	14	9	11	
	d	4	2	3	
November	a	46	59	53	80
	b	33	22	27	
	c	15	9	12	
	d	6	10	8	
December	a	32	52	42	75
	b	33	33	33	
	c	25	10	18	
	d	10	5	7	
January	a	43	52	48	78
	b	31	30	30	
	c	19	14	17	
	d	7	4	5	
February	a	42	53	48	78
	b	31	29	30	
	c	19	9	14	
	d	8	9	8	
March	a	35	61	48	81
	b	38	27	33	
	c	21	9	15	
	d	6	3	4	
The entire year	a	47	61	54	81
	b	30	24	27	
	c	17	9	13	
	d	6	6	6	

APPENDIX VIII.

Storm Warnings.

The Meteorological Office issues notices of atmospherical disturbances on or near the coasts of the British Islands (free of charge) to ports and fishing stations recommended by responsible local authorities.

The fact that one of these notices has been received at any station is made known by hoisting a black canvas cone, 3 feet high and 3 feet wide at base, which has the appearance of a triangle when hoisted. The telegram directing the cone to be hoisted should be exhibited near the signal staff.

At dusk, whenever a signal ought to be flying if it were daylight, a night signal, consisting of three lanterns hung on a triangular frame, may be hoisted in place of the cone.

The Meteorological Office supplies the canvas cone, but does not undertake to supply the lanterns. In all cases the local authorities must undertake the charges incidental to the hoisting of the signal, such as flagstaff and gear, oil, &c., and also as to the keeping of the apparatus in repair, painting, &c.

The following is a list of the stations to which storm-warning telegrams are sent :—

NORTHERN.	WESTERN.	SOUTHERN.	EASTERN.
Scotland, N.E.	Ireland, S.W.	England, S.W.	England, N.E.
Lerwick.	Tuskar L.H.	Scilly.	Berwick - on - Tweed.
Scalloway.	New Ross.	St. Sennen.	Cullercoats.
Dunrossness.	Dunmore East.	Newlyn, West.	Tynemouth.
Stromness.	Dungarvan.	Penzance.	South Shields.
Kirkwall.	Minehead L.H.	The Lizard.	Souter Point L.H.
Cantick Head L.H.	Youghal.	Falmouth.	Sunderland.
Holborn Head.	Queenstown.	Pendennis.	Hartlepool.
Dunnet Head.	Cork.	Mevagissey.	Middlesborough.
Wick.	Passage.	Mount Batten.	Redcar.
Tarbet Ness L.H.	Kinsale.	Plymouth.	Flamborough Hd.
Avoch.	Do. (Old Head).	Devonport.	Whitby.
Inverness.	Galley Head L.H.	Prawle Point.	Filey.
Nairn.	Castletownshend.	Teignmouth.	Bridlington.
Burghead.	Brow Head.	Exmouth.	Hull.
Lossiemouth.	Tralee.		Goole.
Buckie.	Limerick.		Grimsby.
Port Knockie.	Loophead L.H.		Boston.
Cullen.	Galway.		
Portsoy.			
Banff.	Ireland, N.W.		
Fraserburgh.	Tory Island L.H.		
Peterhead.	Rathmullan.		
Aberdeen.	Malin Head.		
Girdleness L.H.	Portrush.		
	Port Ballintrae.		

[*Continued*

NORTHERN.	WESTERN.	SOUTHERN.	EASTERN.
SCOTLAND, E.	IRISH SEA.	ENGLAND, S.	ENGLAND, E.
Stonehaven.	Belfast.	Guernsey.	Sutton Bridge.
Montrose.	Donaghadee.	St. Helier's (Jersey).	Lynn.
Scurdy Ness L.H.	Burr Point.	Gorey „	Sheringham.
Broughty Ferry.	Howth.	Weymouth.	Cromer.
Dundee.	Kingstown.	Anvil Point L.H.	Yarmouth.
St. Andrews.	Pt. of Ayre (I. of M.)	Poole.	Southwold.
Anstruther.	Ramsey „	Southampton.	Orford Ness L.H.
Pittenweem.	Douglas „	Hamble.	Ipswich.
Buckhaven.	Castletown „	Yarmouth.	Harwich.
Wemyss, West.	Silloth.	Cowes.	Gunfleet L.H.
Burntisland.	Maryport.	Ryde.	
Grangemouth.	Workington.	St. Catherine's Pt.	
Bo'ness.	Whitehaven.	Portsmouth.	
Granton.	Barrow.	Littlehampton.	
Newhaven.	Morecambe.	Brighton.	
Leith.	Fleetwood.	Newhaven.	
Fisherrow.	Blackpool.		
Dunbar.	Lytham.		
Cockburnspath.	Southport.		
St. Abb's Head.	Formby.		
Eyemouth.	Liverpool.		
	Runcorn.	ENGLAND, S.E.	
	Hoylake.	Eastbourne.	
	New Brighton.	Hastings.	
	Connah's Quay.	Rye.	
	Penmaenmawr.	Sandgate.	
	Port Penrhyn.	Folkestone.	
	Point Lynas L.H.	Dover.	
SCOTLAND, N.W.	Holyhead.	Deal.	
	South Stack L.H.	Ramsgate.	
Fair Isle L.H.	Caernarvon.	North Foreland.	
C. Wrath L.H.	Port Dinorwic.	Margate.	
Stourhead L.H.	ST. GEORGE'S CHANNEL.	Faversham.	
Port of Ness.	Aberystwyth.	Sheerness.	
Stornoway.	Milford.	Chatham.	
Portnaguiran.	BRISTOL CHANNEL.		
	Pembrey.		
	Llanelly.		
	Swansea.		
	Briton Ferry		
	Porthcawl.		
SCOTLAND, W.	Nash L.H.		
	Penarth.		
Glasgow.	Cardiff.		
Greenock.	Do. (Bute Dock).		
Rothesay.	Do. (Barry Dock).		
Lamlash.	Newport.		
Campbelton.	Weston-super-Mare.		
Mull of Cantire L.H.	Burnham.		
Ardrossan.	Bridgewater.		
Girvan.	Lundy Island.		
Ballantrae.	Ilfracombe.		
Cairn Ryan.	Bull Point L.H.		
Corsewall Point L.H.	Barnstaple.		
	Appledore.		
Mull of Galloway L.H.	Hartland Pt. L.H.		
	Boscastle.		
	Port Isaac.		
	Newquay.		
	Hayle.		
	St. Ives.		

APPENDIX IX.

Fishery Barometers.

List of Places supplied with Fishery Barometers.

Shetland Isles.—Balta Sound, Uya Sound, Burravoe, Nesting, Lerwick, Sandwick, Scalloway, Symbister.

Orkney Isles.—Westray, Papa Westray, Burray, Kirkwall.

Scotland, east coast.—Duncansbay, Freswick, Auchengill, Keiss, Ackergill, Staxigoe, Wick, Lybster, Dunbeath, Inver, Portmahomack, Ballintore, Cromarty, Avoch, Nairn, Burghead, Portessie, Port Knockie, Portsoy, Whitehills, Gardenstown, Rosehearty, Pitullie, Fraserburgh, Inverallochy, Pointlaw, Findon, Portlethen, Skateraw, Stonehaven, Arbroath, Broughty Ferry, St. Andrews, Crail, Cellardyke, St. Monance, Burntisland, Newhaven.

England, east coast.—Berwick, North Shields, South Shields, Sunderland, West Hartlepool, Staithes, Scarborough, Filey, Flamborough, Bridlington Quay, Withernsea, Hull, Lynn (2), Wells, Gorleston, Lowestoft, Orford Haven, Felixstowe, Harwich, Brightlingsea, West Mersea, Maldon, Leigh, Margate, Deal, Kingsdown, Dover.

England, south coast.—Bognor, Ryde, Bembridge, Brixton, Atherfield, Ventnor, Yarmouth (Isle of Wight), Gorey (Jersey), Haslar Hospital, Poole, Weymouth, Portland, Budleigh Salterton, Exmouth, Cawsand, Mevagissey, Gorranhaven, Devoran, Portscatho, Penryn, Durgan, Porthallow, Falmouth, Coverack, Newlyn (2), Mousehole, Penberth, Porth Guarra.

England, south-west coast.—St. Ives, Hayle, Port Isaac, Boscastle, Bideford, Burnham, Highbridge, Weston-super-Mare.

Wales.—Briton Ferry, Swansea, Angle, Milford, Aberystwyth, Nevin, Carnarvon.

England, north-west coast.—Fleetwood, Morecambe, Maryport.

Isle of Man.—Douglas, Port St. Mary, Peel (2).

Scotland, south-west coast.—Port Patrick, Stranraer.

Ireland, east coast.—Cushendall, Belfast, Bangor, Groomsport, Donaghadee, Ardglass, Warren Point, Carlingford, Greenore, Dundalk, Malahide, Howth, Kingstown (2), Bray, Wicklow.

Ireland, south coast.—Dunmore East, Dungarvan, Crosshaven, Kinsale, Union Hall, Castletownsend, Baltimore, Schull (2), Crookhaven, Castletown (Berehaven), Lawrence Cove, Ballydonegan, Ballycrovane.

Ireland, west coast.—Valencia, Dingle, Tralee, Ballyheigue, Tarbert, Kilcredane, Kilronan, Galway, Spiddal, Cleggan, Elly Bay, Ballyglass, Ballycastle (Co. Mayo), Donegal, Tribane, Killybegs, Teelin, Malinmore, Portnoo, Burton Port, Kincaslagh, Bunbeg.

Ireland, north coast.—Dunfanaghy, Rathmullen, Buncrana, Malin Head, Moville, Greencastle, Portstewart, Portrush, Port Ballintrae, Ballycastle (Co. Antrim).

Scotland, west coast.—Tarbert (Loch Fyne), Loch Ranza, Campbeltown, Carradale, Portree, Armadale (Isle of Skye), Isle of Soay, Plockton, Shieldaig, Gruinard, Ullapool, East Mey, Gills, Stroma (2).

Hebrides.—Stornoway, Portnaguran, Obb, Valtos, Carloway, Ness.

APPENDIX X.

METHODS FOLLOWED IN DEALING WITH METEOROLOGICAL RETURNS FROM LAND STATIONS IN THE BRITISH ISLES.

These stations are of seven classes, as stated on page 16.

I.—*Observatories continuously observing all the Meteorological Elements.*

Returns from observatories.

Hourly measurements of the curves obtained from the self-recording instruments at the observatories of the Office are made by the observers at each station, on printed forms supplied for the purpose, which, together with the curves, are forwarded to the Office weekly. They comprise measurements of the barograms, of the dry-bulb and wet-bulb thermograms, of the anemograms, and of the rain-gauge curves.

Examination of returns.

The measurements are subjected to a careful examination in order to ensure as far as possible their accuracy, and the revised regulations which have been adopted to secure this end will be found in the Report of the Office for 1890. They comprise rules for the guidance of observers, as well as of the assistants charged with the examination of the work at the Office. Attention need be called here to only two of these rules, viz., (*a*) the use of subsidiary sheets on which are entered the results of a second set of measurements of the curves made after, and quite independently of, the first set, and with a different form of scale, the two sets of measurements being afterwards compared together, and any differences found inquired into and set right; and (*b*) the re-measurements of the curve made by the assistants at the Meteorological Office, and which always amount to 40, and in doubtful cases to many more, per month, for each element.

Results of examination and report to Council.

The attention of the observers is always drawn to such errors as may be detected, and to any failures in the continuity of the curves arising from failure of the light, stoppage of the clock, defective photography, faulty action of the wet-bulb thermometer, &c.; a report containing the results of the examination of each observatory being also submitted to the Council periodically. The tabulations are eventually bound and stored with the curves in the Office.

General supervision of observatory work.

In connexion with this work should be mentioned the general watch which has to be kept over the working of the observatories and of the instruments, not only to secure uniformity amongst them and observance of rules, but also to guard against small changes which are liable to occur at certain times, especially with the thermographs, and which may affect the scale-values of the instrument or the datum lines used for the tabulation of the curves. About twice a year this work calls for special examination, entailing some considerable time, and occasionally the engraving of new scales, for measuring the curves.

METHOD OF DEALING WITH THE NUMERICAL RESULTS FROM THE SELF-RECORDING OBSERVATORIES.

Interpolations.

In dealing with the tabulations the first step is to go over the sheets and fill up by interpolation, wherever possible, any gaps or breaks in the continuity of the record.

The records having been made as complete as possible, are then used for the calculation of daily and hourly mean values, for periods of five days, calendar months, and for the year; which, together with other data obtained from the same source, are published under the title of "Hourly Means of the Readings obtained from the Self-recording "Instruments at the Five Observatories under the Meteorological "Council." The volume for 1894 is in the press. See p. 18.

It will be noticed that this publication includes results from only five observatories, while on page 17 seven observatories are mentioned. This is owing to the fact that since the year 1884 the records at Stonyhurst and Glasgow have not been fully published by the Office (although the stations are partially subsidized by it, in order to maintain the record established in 1868 and published for the years 1869 to 1883), where, however, the curves are stored for future use if required.

Returns from both these observatories are published in "Returns from Stations of the Second Order," and meteorological results for Stonyhurst are printed independently by the college authorities.

II.—*Anemographic Stations at which the Wind is recorded continuously.*

Anemographs.

The anemograms received from Alnwick Castle, Deerness, Dublin, Fleetwood, Holyhead, North Shields, Scilly, and Yarmouth are regularly examined and tabulated in the Office, and the sheets bound up in volumes. Besides special inquiries on legal and other points that from time to time arise, and in which these documents are of high importance, the tabulations are always employed in the preparation of the various Reports issued by the Office. They are also regularly used in the checking of the Storm Warnings.

III.—*Barographic Stations at which the Atmospheric Pressure is continuously recorded.*

Barographs.

These stations are for the most part either telegraphic reporting stations or stations of the second order. The instrument in most general use is Richard's self-recording aneroid. At the telegraphic stations the record is first used to inform the observers as to the changes which have occurred since the last observing hour, and these changes, when large, are reported by wire to London, and are used in preparing the forecasts. The curves themselves are forwarded to the Office weekly and are stored for future use.

IV.—*Sunshine Stations at which the duration of Bright Sunshine is continuously recorded.*

Sunshine records.

The daily records of sunshine which are now received from 49 Stations in the British Islands are examined generally, to guard against accidental changes in the adjustment of the instruments. Notes explaining any omission or accidental defect are added to the cards, if required, and after their receipt has been acknowledged, they are duly stamped, dated and then stored in the Office.

Weekly totals.

A tabulation of these curves is published as part of the Weekly Weather Report, mentioned in Appendix VI., and for those stations, which are also Stations of the Second Order, the monthly totals of bright sunshine in hours, together with the per-centages of its possible duration, are published as Part IV. of "Returns from Stations of the Second Order." Hourly tabulations are made in the Office of the returns from the observatories, and the mean hourly amounts are published in the volumes of "Hourly Means." A table showing the daily amount of sunshine at Bunhill Row, one of the London stations, is also prepared quarterly, for the Royal Meteorological Society.

V.—*Telegraphic Reporting Stations.*

These are 30 in number in these islands, and the particulars as to the observations taken at them, and the methods adopted in dealing with them, will be found fully detailed in Appendix VII. to the Report for 1888–89, and in Appendix VI. to the present volume.

VI.—*Land Stations.*

Origin and progress of system.

Ever since the year 1866 returns of more or less completeness have been received from land stations in the United Kingdom. In that year there was only one station, but by 1871 the number had increased to 15, and five years later to 49, including 14 stations belonging to the Royal Meteorological Society, copies of the returns from which were sent to the Office under a special arrangement with the Society.

At the end of March 1897 the total number of stations was 140, including 17 belonging to the Royal Meteorological Society and 19 belonging to the Scottish Meteorolcgical Society.

The Stations of the Second Order are distributed as follows: 42 in England, 2 in Wales, 24 in Scotland, and 11 in Ireland.

The methods followed with regard to the examination and publication of these returns have been fully detailed in previous reports, and need not now be repeated. The changes introduced into the volume for 1886 have been continued in those for later years. These refer to the barometer readings, which are now given at station-level instead of being reduced to the mean sea-level; and to the humidity, where the depression of wet bulb is shown, the international forms A and B being modified accordingly.

The volume of "Returns from Stations of the Second Order" for 1893 contained returns from 71 stations, while that for 1894, now in the Press, contains returns from 72 stations.

Arrangements have been made under which it is hoped that the arrears of this publication will be rapidly reduced.

Reports from the Irish stations are regularly supplied to the Registrar-General for Ireland for his Weekly and Quarterly Returns.

New stations.

When an application for the adoption of a new station is received, a schedule is forwarded to the observer containing a series of questions as to the outfit of the station, the exposure of the instruments, and the influence likely to be exerted on their indications by surrounding objects, such as houses and trees. Only mercurial barometers are accepted, and only such as have been duly verified. All thermometers must have been tested at Kew. A plan of the station, showing the positions of the instruments with regard to neighbouring objects, is also required.

On the return of this schedule the answers are considered, and, where necessary, alterations are advised.

If, however, the existing arrangements are satisfactory, tables for reducing the barometer readings to 32° Fahrenheit at mean sea-level are prepared and duplicates sent to the observer, together with a set of Hygrometrical Tables, and a copy of "Instructions in the Use of Meteorological Instruments."

The first returns are compared and examined with special care, and a report of the result of the examination is forwarded to the observer, with instructions how best to improve and complete the returns.

There are still many parts of the British Islands very poorly represented by the existing stations; for instance, Wales, the northern coasts of Cornwall and Devon, Somersetshire, Essex, the south-east of Ireland, &c., and any information for these districts would be valuable.

VII.—*Land Stations of the Third Order.*

These are 61 in number. The information supplied from them is, in some cases, similar to that supplied by a station of the second order, but taken only once daily, or at irregular hours, or perhaps less complete. At other stations less detail is given; for instance, 31 stations furnish only the daily rainfall. All the information thus afforded is utilised in some way or other, though it is not all included in the Office publications. The rainfall values are copied and supplied to Mr. Symons, F.R.S., for publication in "British Rainfall."

Inspection.

The Stations of the Second Order are regularly inspected, the attention of the inspector being directed by the Office to any special point which may require investigation.

List of Stations.

In Appendix XI., page 76, is given a complete list of the stations supplying information to the Office.

APPENDIX XI.

LIST of STATIONS in the BRITISH ISLANDS from which INFORMATION has been received at the METEOROLOGICAL OFFICE during the year ending March 31st, 1897.

The Stations marked "S" are in connexion with the Scottish Meteorological Society, and those marked "R" are in connexion with the Royal Meteorological Society. The returns from these Stations are received by the Office under an arrangement which will be found detailed in previous reports.

In certain cases where the actual station at which the Observations have been taken is not generally known, and could not be readily identified, the name of some village or town near has been inserted following the name of the station, within brackets.

The nature of the information received from each station is indicated by letters as follows :—

A. *Observatories.*—Continuous record of pressure, temperature, wind, sunshine and rain, with eye observations of the amount, form, and motion of the clouds, and notes on the weather.

B. *Anemographic Stations.*—Continuous record of the direction and velocity (or force) of the wind.

C. *Barographic Stations.*—Continuous record of pressure.

D. *Second Order Stations.*—Regular observations at 9 a.m. and 9 p.m. each day, local time, of pressure, temperature (dry bulb and wet bulb), wind, cloud, and weather, with the daily maxima and minima of temperature, the daily rainfall, and general remarks on the weather.

E. *Second Order Stations.*—Monthly means and summaries on Form B. of observations taken at 9 a m. and 9 p.m., each day as above.

F. *Climatological Stations.*—The maximum and minimum temperature and the rainfall for each day, with remarks on the weather. This information is received in the Meteorological Office each week for use in the "Weekly Weather Report."

G. *Third Order Stations.*—Observations of the same kind as at Second Order Stations, but either :—

(*a*) less full.
(*b*) taken only once daily.
(*c*) taken at irregular hours.

R. *Rainfall Stations.*—Daily observations of the amount of rainfall, with remarks on the weather.

S. *Sunshine Stations.*—Continuous record of bright sunshine.

T. *Telegraphic Stations.*—Regular observations at 8 a m. and 6 p.m. G.M.T. (and from some stations at 2 p.m. in addition), of pressure, temperature, wind and weather, with the daily maxima and minima of temperature, the daily rainfall, and, where possible, the sea-disturbance at 8 a m. each day and the daily amount of bright sunshine. This information is received at the Meteorological Office each day by telegraph, for use in the "Daily Weather Report" and, as required, for use in the "Weekly Weather Report."

W. *Sea-temperature.*—Daily observations of the temperature of the sea water.

Station.	Lat.	Long.	Height in feet above M.S.L.	Observer.	Nature of Information supplied.	Page where Inspector's Report for 1896 will be found.
Aberdeen Observatory -	57° 10′	2° 6′ W.	46	Prof. C. Niven -	A. T. C.	36, 55
„ Cove Bay -	57 9	2 5 „	—	Coastguard - -	W.	
Alnwick Castle - -	55 25	1 43 „	210	Humphry Willyams, for the Duke of Northumberland.	B. F.	46, 56
Ardrossan, Ayrshire -	55 38	4 50 „	15	J. W. Mayes -	T.	35
Arley Cottage (Mount Nugent).	53 50	7 18 „	262	The Lord Farnham -	D. S.	
Arlington Court, Barnstaple.	51 8	3 58 „	613	W. Stewart, for Lady Chichester.	F.	37
Armagh Observatory -	54 21	6 39 „	196	J. L. E. Dreyer -	B.D.F.S.	59
Arran, North, Galway -	53 6	9 40 „	—	Coastguard - -	G. W.	
Aysgarth Vicarage, Yorks -	54 18	1 58 „	646	Rev. F. W. Stow -	D.	
Bahama Bank Lightship	54 20	4 13 „	—	Light-keepers -	W.	
Ballantrae, Ayrshire -	55 6	5 0 „	—	Coastguard - -	W.	
Ballydonegan, Co. Cork -	51 38	10 3 „	—	„ -	W.	
Ballyglass, Co. Mayo -	54 17	9 52 „	—	„ -	W.	
Baltimore, Co. Cork -	51 28	9 22 „	—	„ -	G.	
Bantry - - -	51 41	9 27 „	—	R. Brennan -	R.	
Belmullet, Co. Mayo -	54 13	9 59 „	40	Miss E. Tolan -	T.	40
Belvoir Castle, Grantham -	52 54	0 47 „	259	W. H. Divers (for the Duke of Rutland).	D.	47
S Ben Nevis - - -	56 48	5 0 „	4,406	R. T. Omond, for Directors Ben Nevis Observatory.	S. E.	
✠ Bennington, Herts. -	51 54	0 5 „	407	Rev. J. D. Parker -	E.	
✠ Berkhamsted - -	51 46	0 34 „	400	E. Mawley - -	E.	
Bidston Observatory, Liverpool.	53 24	3 4 „	188	W. E. Plummer -	D. T.	38
Birr Castle, Parsonstown -	53 6	7 55 „	175	O. Boeddicker, for Earl of Rosse.	D. S. T.	
✠ Blackpool - - -	53 48	3 3 „	31	A. J. Anderson -	F. S.	
Blacksod Point, Co. Mayo -	54 6	10 4 „	—	Coastguard - -	W.	
Bolton, Chadwick Museum	53 35	2 27 „	389	W. W. Midgley -	G.	
Bournemouth - -	50 43	1 53 „	—	Messrs. Primavesi, for Town Council.	S.	50
S Braemar - - -	57 0	3 24 „	1,111	J. Aitken - -	D. F. S.	
Bramley, Surrey - -	51 11	0 33 „	148	J. Bartlett - -	D.	49
Bray, Co. Wicklow - -	53 12	6 6 „	—	Coastguard - -	G.	
Brighton - - -	50 49	0 8 „	—	A. Newsholme -	S.	50
Burnmouth, Ayton, Berwick	55 51	2 4 „	—	Coastguard - -	W.	
Burntisland - - -	56 4	3 14 „	—	„ - -	W.	
✠ Buxton - - -	53 14	1 54 „	987	E. A. Dent - -	E.	
Caernarvon Bay Lightship	53 6	4 45 „	—	Light-keepers -	W.	
Cambridge - -	52 13	0 6 E.	88	Miss A. Walker -	T. S.	43
Cardigan Bay Lightship -	52 25	5 1 W.	—	Light-keepers -	W.	
S Cargen - - -	55 2	3 37 „	72	P. Dudgeon (the late) and A. Peacock.	E.	35
Carrigallen, Co. Leitrim -	53 58	7 38 „	? 350	Mrs. J. Godley and Miss Morrow.	R.	
Castletownshend, Co. Cork	51 32	9 11 „	—	Coastguard - -	G.	
Chatham - - -	51 23	0 32 E.	136	The Instructor in Surveying.	G.	51
✠ Cheadle - - -	52 58	1 57 W.	646	J. C. Philips -	E. F.	
✠ Cheltenham - - -	51 54	2 3 „	184	R. Tyrer - -	E.	
Chester - - -	53 12	2 54 „	59	Rev. J. Cairns Mitchell.	D,	38
Churchill, Oxon - -	51 56	1 34 „	509	Giles Edmonds -	R.	42
✠ Churchstoke - -	52 31	3 5 „	533	P. Wright - -	D. F. S.	
Cirencester - - -	51 43	1 57 „	446	Prof. Ohm - -	F. S.	42
Cleggan, Co. Galway -	53 33	10 8 „	—	Coastguard - -	W.	
Clifton - - -	51 27	2 37 „	230	D. Rintoul - -	F.	37
Colly Weston - -	52 37	0 31 „	280	Miss A. Tasker -	R.	43
Colwyn Bay - - -	53 17	3 43 „	—	R. E. Lord - -	S.	38
Coningbeg Lightship -	52 2	6 40 „	—	Light-keepers -	W.	
Cooper's Hill, Egham -	51 26	0 34 „	279	Prof. H. McLeod -	G.	
Cromarty - - -	57 41	4 0 „	—	Coastguard - -	W.	
Cronkbourne (Douglas) -	54 10	4 29 „	137	A. W. Moore -	D. F. S.	38
Crookhaven - - -	51 28	9 43 „	—	Coastguard - -	G.	
Crosshaven - - -	51 48	8 18 „	—	„ - -	G.	
Cuckfield, Sussex - -	51 1	0 9 „	389	John Howe - -	R.	51
✠ Cullompton - - -	50 51	3 23 „	202	T. Turner - -	F. S.	
Currygrane (Edgeworthstown), Co. Longford.	53 45	7 39 „	267	J. M. Wilson -	D. F.	
Daunt's Rock Lightship -	51 43	8 16 „	—	Light-keepers -	W.	
Deerness, Orkney Islands -	58 56	2 45 „	169	M. Spence - -	B. D. S.	36 54
Dolmelynllyn (Dolgelly) -	52 47	3 53 „	—	W. Simonds, for C. R. Williams.	R.	

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	Donaghadee	54 38	5 32 W.	26	T. MacGowan	T.	
	Doneraile, Co. Cork	52 13	8 34 „	266	Captain Evans	R.	
	Dover, Waterworks	51 7	1 18 E.	198	H. E. Stilgoe	R.	51
	Dublin, Botanic Gardens	53 23	6 16 W.	67	F. W. Moore	D.	33
	„ City	53 20	6 15 „	47	J. W. Moore	D. F.	33
	„ Mountjoy Obs., Phœnix Park.	53 22	6 21 „	155	Maj. R. C. Hellard, R.E.	B. D. S.	60
	Duddington	52 36	0 32 „	152	Fred Coventry	R.	43
S	Dundee	56 28	2 56 „	160	J. Carnochan	D. S.	
	Dunfanaghy (Sheephaven)	55 11	7 58 „	—	Coastguard	W.	
	Dungeness	50 55	0 59 E.	26	W. Batton	T.	48
S	Dunrobin Castle	57 59	3 56 W.	12	D. Melville, for the Duke of Sutherland.	D.	36
	Durham	54 46	1 35 „	336	H. J. Carpenter	D. F. S.	46
	Duraley (Farnley), Glos.	51 41	2 21 „	250	R. W. Pinney	R.	42
	Eastbourne	50 46	0 17 E.	38	R. Sheward	D. S.	49
	East Goodwin Lightship	51 13	1 36 „	—	Light-keepers	W.	
	East Dereham	52 41	0 57 E.	158	G. H. Cooper	R.	
	Edgbaston (Birmingham)	52 28	1 56 W.	534	Alf. Cresswell	D.	
	Edinburgh	55 57	3 12 „	253	R. C. Mossman	D. S.	36
	English and Welsh Grounds Lightship.	51 27	3 0 „	—	Light-keepers	W.	
	Ennis, Co. Clare	52 51	8 59 „	18	P. L. K. Dobbin	R.	
	„ „ Roslevan	52 51	8 59 „	38	Miss A. L. Scott	R.	
	Epsom, R. Med. College	51 20	0 14 „	271	W. T. N. Spivey and H. E. Gardner.	D.	49
	Falmouth	50 9	5 4 „	167	E. Kitto	A. F.	61
	Fleetwood	53 56	3 1 „	—	M. S. Gaulter	B.	59
	Forgandenny, Perth	56 21	3 29 „	175	C. L. Wood	C.	
S	Fort Augustus	57 8	4 40 „	68	Rev. M. Wall	E. F. S.	35
	Fort William	56 48	5 6 „	31	R. T. Omond, for Directors, Ben Nevis Observatory.	A. F.	35, 53
	Foynes, Co. Limerick	52 37	9 7 „	108	Lord Monteagle	F.	
	Fredville (Dover)	51 7	1 18 E.	173	H. W. Plumptre	R.	51
	Fulbeck, Lincolnshire	53 3	0 37 W.	185	Rev. Vere F. Willson	D.	47
	Geldeston (Beccles)	52 28	1 31 E.	37	E. T. Dowson	D. F. S.	43
	Gilcrux (Maryport)	54 44	3 23 W.	261	J. Monkhouse	D. F. S.	40
	Glasgow	55 53	4 18 „	180	Prof. L. Becker	A. D. F.	53
S	Glencarron	57 30	5 14 „	489	D. D. Munro	E. F.	
S	Glenlee	55 5	4 12 „	203	W. Melville	E. F.	35
S	Gordon Castle	57 37	3 5 „	101	C. Webster (for the Duke of Richmond and Gordon, K.G.).	E.	
	Gorleston, Suffolk	52 35	1 43 E.	—	R. J. C. Day	G.	
	Guernsey (St. Peter's)	49 32	2 32 W.	—	F. E. Carey	S.	37
	Harpenden, Herts.	51 49	0 20 „	419	T. Wilson	G.	
	Harrogate	54 0	1 33 „	344	G. Farrah	F. S.	
	Haslar Hospital, Hants	50 47	1 7 „	—	T. Rogers	G.	
	Hawes Junction	54 19	2 18 „	1135	W. H. Bunce	G.	
	Hesley Hall (Bawtry)	53 26	1 2 „	65	B. I. Whitaker	F.	47
S	Hereford	52 5	2 45 „	274	T. A. Chapman	F.	
	Heysham Hall, Lancashire	54 3	2 54 „	95	S. Lomas, for Miss L. Grafton.	D.	39
S	Hillington	52 48	0 33 E.	88	Rev. H. E. B. Ffolkes	D. F. S.	
	Holyhead, Harbour Office	53 18	4 39 W.	57	F. M. Cotton	B. W.	57
	„ Sailors' Home	53 18	4 39 „	48	T. Chope	T.	33
	Hurdlestown, Broadford, Co. Clare.	52 48	8 38 „	157	Maj. W. O. Bentley, R.A.	R.	
	Hurst Castle	50 42	1 33 „	12	E. T. Tremble	T.	48
	Kearsney Abbey, Dover	51 8	1 17 E.	? 100	C. W. Curtis	R.	51
	Ketton, Stamford	52 38	0 32 W.	—	F. Coventry	F. G.	43
	Kew Observatory	51 28	0 19 „	18	C. Chree	A.	
	Kilcredane, Co. Clare	52 35	9 47 „	—	Coastguard	W.	
	Kilkenny	52 39	7 14 „	212	H. Carlton, for the Marquis of Ormonde.	C. F.	
S	Killarney	52 4	9 30 „	86	Ven. Archdeacon Wynne.	E. F.	
	Killiney (Cloneevin), Co. Dublin.	53 16	6 7 „	249	R. O'Brien Furlong	R.	
	Kirkwall	58 59	2 57 „	—	Coastguard	W.	
	Kish Bank Lightship	53 19	5 55 „	—	Light-keepers	W.	

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	Ladylaw (Hawick) - -	° ′ 55 28	° ′ 2 47 W.	447	T. Wilson - -	C. D.	35
	Lahinch - - -	52 55	9 21 „	52	Miss J. Bowes -	R.	
S	Lairg - - - -	58 1	4 22 „	335	Rev. D. Macree -	E.	36
	Lamlash, Isle of Arran, Scotland.	55 32	5 8 „	—	Coastguard - -	W.	
	Landale, Argyleshire -	56 41	5 41 „	14	A. Fletcher, for T. H. G. Newton.	D. F.	35
S	Lednathie - -	56 45	3 7 „	719	W. Morrison (for Stormonth Darling).	E.	
	Leith - - - -	55 58	3 10 „	20	T. Richardson -	T.	36
	Leman and Ower Lightship	53 8	2 2 E.	—	Light-keepers - -	W	
	Lerwick - - -	60 9	1 8 W.	—	Coastguard - -	W.	
	Limerick - - -	52 39	8 36 „	—	A. W. Shaw - -	R.	
	Liscannor, Co. Clare -	52 56	9 23 „	—	Coastguard - -	W.	
S	Lissan, Co. Tyrone - -	54 41	6 45 „	300	Sir N. Staples, Bt. -	E.	
	Llandinam, Montgomery -	52 29	3 26 „	500	Edward Davies -	R.	
	Llandovery - - -	51 59	3 48 „	217	J. Watkins - -	F.	41
S	Llandudno - -	53 21	3 50 „	88	J. Nicol - - -	E. F.	
	„ - - -	53 21	3 51 „	? 20	J. McMaster -	S.	
	London, Brixton - -	51 29	0 7 „	77	F. Gaster - -	T.	
	„ City - -	51 32	0 5 „	80	Messrs. de la Rue -	S.	
	„ Pall Mall - -	51 32	0 8 „	—	Athenæum Club -	C.	
	„ Westminster -	51 31	0 8 „	76	The Staff of the Met. Office.	C. G.	
	„ Westminster Training College.	51 31	0 8 „	—	H. A. Reatchlous -	S.	
	Londonderry - -	55 0	7 19 „	67	J. Conroy - -	D. F.	40
	Loughborough - -	52 47	1 12 „	169	W. Berridge - -	T.	43
	Lowestoft - -	52 29	1 44 E.	—	J. Moore - -	G.	
S	Lowestoft - - -	52 29	1 44 „	85	S. H. Miller - -	E.	
	Malin Head, Co. Donegal -	55 23	7 24 W.	230	J. Williams - -	T. C.	40
	Manchester - - -	53 29	2 13 „	190	J. Niven - -	G. S.	39
S	Marchmont - - -	55 44	2 25 „	498	J. A. Wood - -	E. F. S	
S	Margate - - -	51 24	1 24 E.	83	J. Stokes - -	S.	50
	Market Rasen - - -	53 23	0 20 W.	83	W. B. Jevons - -	R.	47
	Markree Castle, Co. Sligo -	54 11	8 27 „	122	A. Marth, for Col. Cooper.	D. F. S.	
	Minard, Co. Kerry - -	52 7	10 8 „	—	Coastguard - -	W.	
	Nairn - - -	57 36	3 52 „	84	Miss Penny - -	T.	35
	Newcastle-on-Tyne - -	54 59	1 36 „	152	N. H. Martin -	G. S.	46
	Newarp Lightship -	52 45	1 53 E.	—	Light-keepers -	W.	
	Newport, Monmouth -	51 35	3 0 W.	—	F. W. Houghton -	R.	
	Newquay, Cornwall -	50 25	5 4 „	? 250	J. Pearce - -	S.	46
	„ „ -	50 25	5 5 „	—	Coastguard - -	W.	
	Northallerton - -	54 20	1 26 „	129	W. Stead - -	R.	
	North Foreland - -	51 23	1 27 E.	115	A. Cox and Jenkins	T.	48
	North-West Lightship, Liverpool.	53 31	3 31 W.	—	Light-keepers - -	W.	
S	Norwood - - -	51 26	0 6 „	220	W. Marriott - -	E.	
S	Ochtertyre - - -	56 23	3 53 „	329	G. Croucher, for Sir P. K. Murray, Bt.	E. F.	
	Omagh (Edenfel) - -	54 36	7 19 „	300	Col. Buchanan -	F.	40
	Oswaldkirk, Yorks. -	54 12	1 3 „	--	R. Thompson -	S.	46
	Outer Dowsing Lightship -	53 27	1 5 E.	—	Light-keepers -	W.	
	Owers Lightship - -	50 39	0 41 W.	—	„ -	W.	
	Oxford - - -	51 46	1 16 „	208	W. Wickham, for the late E. J. Stone.	T. S.	41, 62
	Parkstone, Dorset -	50 43	1 56 „	197	R. H. Barnes -	D.	49
	Penbedw, Mold - -	53 12	3 11 „	650	H. W. Buddicom -	C.	
	Pennant Bay, Aberdour -	57 40	2 16 „	—	Coastguard - -	W.	
S	Pinmore, Girvan - -	55 12	4 49 „	187	P. Donald, for Capt. Hamilton.	E.	
	Plymouth, The Hoe -	50 22	4 8 „	116	H. Victor Prigg -	D. F. S.	37
	„ Freedom Fields	50 24	4 8 „	207	„ - -	R.	
S	Poltalloch - - -	56 8	5 30 „	132	J. Russell, for Lord Malcolm.	E.	35
	Portrush - - -	55 13	6 40 „	—	Coastguard - -	W.	
	Prawle Point - -	50 12	3 43 „	332	M. Holmes - -	T.	37
	Prestwich - - -	53 32	2 17 „	320	T. R. H. Clunn -	D. F. S.	39
	Rede Court, (Rochester) -	51 24	0 29 E.	224	W. H. Tingey -	D.	49
	Roche's Point, Co. Cork -	51 47	8 19 W.	42	W. Kennedy -	T.	

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	Rochford, Tenbury -	° ′ 52 18	° ′ 2 36 W.	316	Rev. John Tomson -	C. R.	42
S	Rosewell - - -	55 51	3 7 „	690	R. W. D. Cameron -	E.	
	Rothamsted - - -	51 48	0 22 „	368	Sir J. B. Lawes and Sir J. H. Gilbert.	F. S.	
S	Rothesay - - -	55 50	5 4 „	115	J. Kay - -	E.	35
R	Rounton, Yorkshire -	54 24	1 18 „	249	Sir I. L. Bell, Bart.	E.	
R	Rousdon, Devon - -	50 43	3 0 „	515	C. E. Peek - -	E.	
	Roxborough, Co. Limerick	52 35	8 36 „	111	A. W. Shaw -	R.	
	Royal Sovereign Light-ship.	50 43	0 27 E.	—	Light-keepers -	W.	
	Rugby - - -	52 22	1 15 W.	379	E. Kitchener -	G.	42
	St. Ann's Head, Pembroke	51 41	5 11 „	150	H. T. Knott -	T. S. W.	
	St. Aubin's, Jersey -	49 12	2 11 „	25	J. Fisher - -	T.	38
	St. David's, Pembrokeshire	51 53	5 16 „	215	W. P. Propert -	D.	
	St. Helen's, Lancashire -	53 28	2 45 „	151	J. Robertson -	G.	39
	St. Heliers, Jersey - -	49 11	2 6 „	—	Signal Officer, Fort Regent.	S.	38
	St. Leonards - -	50 51	0 33 E.	171	H. Colborne - -	D. F. S.	49, 50
	Salcombe, Devon - -	50 14	3 46 W.	—	Coastguard - -	W.	
	Sandgate, Kent - -	51 4	1 9 E.	56	A. Robert Bowles -	R.	51
R	Scarborough - -	54 17	0 23 W.	159	E. W. Ellerbeck -	D. F.	
	„ - -	54 17	0 23 „	—	Coastguard - -	W.	
	Schull - - -	51 32	9 32 „	—	„ - -	G.	
	Scilly Islands, St. Mary's	49 56	6 18 „	80	A. Hicks - -	B.S.T.W.C.	44, 45
	Seafield, Miltown Malbay Co. Clare.	52 48	9 30 „	—	Coastguard - -	W.	
	Seaham Harbour - -	54 50	1 19 „	148	G. H. Aird - -	D.	46
	Sedbergh - - -	54 19	2 32 „	400	A. P. Burra - -	R.	39
	Seven Stones Lightship -	50 4	6 5 „	—	Light-keepers -	W.	
	Shambles Lightship -	50 31	2 20 „	—	„ - -	W.	
	Sheffield - - -	53 23	1 29 „	429	E. Howarth - -	D.	47
	Shields, North - -	55 0	1 27 „	97	J. W. Irvine -	T.	45
	Shields, North, High Light-house.	55 0	1 27 „	—	Captain Harrison -	B.	56
	Shipwash Lightship -	52 2	1 38 E.	—	Light-keepers -	W.	
	Shirley, near Birmingham	52 25	1 49 W.	460	B. Boothroyd -	F.	42
	Skipton - - -	53 58	2 9 „	567	W. Ecroyd - -	G.	40
	Solway Lightship - -	54 48	3 32 „	—	Light-keepers -	W.	
	Southampton - -	50 55	1 24 „	78	J. T. Cook, for Dir. Gen. of Ordnance Survey.	D.F.S.	49, 50
	Southport - - -	53 39	2 59 „	—	J. Baxendell -	S.	39
	South Rock Lightship -	54 25	5 22 „	—	Light-keepers -	W.	
	Spidall, Co. Galway -	53 15	9 17 „	—	Coastguard - -	G.	
	Spurn Head - - -	53 34	0 7 E.	19	G. Freeman - -	T.	45
	Spurn Lightship - -	53 34	0 13 „	—	Light-keepers -	W.	
	Stokesay, Craven Arms -	52 26	2 52 W.	370	Miss M. A. Digges La Touche.	D.	
	Stonyhurst College - -	53 51	2 28 „	375	Rev. W. Sidgreaves	A.D.F.	58
	Stornoway - - -	58 11	6 22 „	28	J. Mackenzie -	T.S.O.	
	„ - - -	58 11	6 22 „	—	Coastguard - -	W.	
R	Stowell, Sherborne, Dorset-	50 57	2 31 „	376	Rev. H. J. Poole -	F.	
	Stranraer - -	54 54	5 2 „	—	Coastguard - -	G.	
R	Strathfield Turgiss, Hants	51 20	1 0 „	195	The late Rev. C. H. Griffith.	F.	
	Strathpeffer-Spa, N.B. -	57 37	4 28 „	253	J. Tregelles Fox -	D. S.	35
	Sumburgh Head (Shetlands)	59 51	1 17 „	126	Rev. W. Brand -	T. C.	36
	Sunderland - - -	54 54	1 23 „	—	Coastguard - -	W.	
	Symbister, Shetlands -	60 14	1 25 „	—	J. S. Nicolson -	G.	
	Syston, Leicester - -	52 43	1 5 „	178	S. K. Daniels -	R.	43
R	Tavistock - -	50 33	4 8 „	391	E. E. Glyde - -	D.	
	Tealby, Lincolnshire -	53 24	0 16 „	251	Rev. S. Lewin -	D.	47
	Teelin, Co. Donegal -	54 38	8 39 „	—	Coastguard - -	W.	
	Tenby - - -	51 41	4 42 „	79	W. T. Balmer -	S.	
	Thurcaston, Leicester -	52 42	1 10 „	253	Rev. T. A. Preston -	S.	43
	Torquay - - -	50 28	3 31 „	—	A. Chandler -	S.	
	Totland Bay, Isle of Wight	50 41	1 33 „	84	J. Dover - -	G.	
	Union Hall, Co. Cork -	51 33	9 8 „	—	Coastguard - -	G.	
	Uppingham - - -	52 35	0 44 „	484	Rev. G. H. Mullins	D.	
	Uzon (Montrose) - -	56 40	2 28 „	—	Coastguard - -	W.	
	Valencia Observatory, Cahirciveen.	51 56	10 15 „	30	J. E. Cullum -	A. T. C.	60
	Island, Glanleam	51 56	10 20 „	—	Miss E. FitzGerald	R.	
,	Knightstown -	51 55	10 20 „	—	Coastguard - -	G.	

Station.	Lat.	Long.	Height in feet above M.S.L.	Observer.	Nature of Information supplied.	Page where Inspector's Report for 1896 will be found.
	° ′	° ′				
§Wakefield	53 41	1 30 W.	96	H. Clarke	E.	
Waterford	52 66	7 7 „	—	Harbour Authorities	C.	
Watergate (Emsworth)	50 56	0 55 „	—	R. Christy	S.	50
Westbourne, Sussex	50 52	0 55 „	—	Rev. L. B. Birkett	S.	51
Westray, Orkney	59 17	3 0 „	—	J. Hewison	G.	
Wick	58 27	3 6 „	80	J. Sinclair	T.	36
„	58 27	3 6 „	—	Coastguard	W.	
§ Wolfelee	55 23	2 39 „	587	W. Cockburn	D.	
§ Woolscombe	51 10	4 12 „	59	E. Henshall	D.	
Worksop	53 18	1 8 „	—	H. Mellish	S.	47
Yarmouth	52 37	1 43 E.	10	G. T. Watson	B.T.C.	43, 56
„ Isle of Wight	50 42	1 29 W.	—	Coastguard	G.	
Ynis-y-bro, Newport	51 38	3 3 „	115	D. Morgan	R.	
York, Bootham	53 57	1 5 „	—	J. E. Clark	S.	46
„ The Museum	53 57	1 5 „	56	H. M. Platnauer	D. T.	45

In addition to those already mentioned, reports are received daily from the following Continental Stations.

Station.	Authority.	Station.	Authority.
Haparanda	Meteorological Office, Stockholm.	†The Helder	Bureau Central Météorologique Paris.
Herndsand		Brussels	
†Stockholm		Cape Gris Nez	
Wisby		†Brest (St. Mathieu)	
Karlstad		Lorient (Île de Groix)	
Bodö	Meteorological Institute, Christiania.	*†Rochefort (Ile d' Aix)	
†Christiansund		†Biarritz	
*†Skudesnaes		†Paris	
Færder		Belfort	
†The Scaw	Meteorological Institute, Copenhagen.	Lyons	
Fanö		Nice	
Cuxhaven	Deutsche Seewarte, Hamburg.	Perpignan	
		Berlin	Cent. Met. Inst. of Germany.
		Wiesbaden	
		Munich	
		Corunna	Observatory, Lisbon.
		†Lisbon	
		Azores (P. Delgada)	

Note.—The stations marked with an asterisk (*) report also at 2h. p.m., and those with dagger (†) at 6h. p.m.; Lisbon reports at 4h. p.m. instead of 6h. p.m.
The Helder does not send reports at 6 p.m. on Sundays.

APPENDIX XII.

LIST of DOCUMENTS received from FOREIGN LAND STATIONS during the year ending March 31st, 1897.

Place.	Observer.	Nature of Observations.
Aden - - - -	Captain Batten, H.M.S. "Marathon"	Notes on storm of October 13 to 15, 1896.
Antigua - - -	Francis Watts - - -	Two observations daily, 1896, March to December; 1897, January, February.
Bahamas (Abaco) - -	T. R. Thompson, Sen., and G. W. J. Demerritt, Lightkeepers.	Lighthouse Register, 1896, January to December.
„ (Cat Cay) - -	A. S. Haigh - - -	Barometer diagrams, 1896, February to October; 1897, January, February.
„ (Cay Lobos) - -	Lightkeeper - - -	Lighthouse Register, 1896, January to December.
„ (Cay Sal) - -	„ - - - -	„ „ 1895, July to December; 1896, January to December.
„ (Inagua) - -	S. W. Hall, Lightkeeper - -	„ „ 1896, January to December.
„ (Nassau) - -	J. A. Kerr - - - -	One observation daily, 1896, March to December; 1897, January, February.
„ (Watling Island) -	T. R. Thompson, jun., Lightkeeper -	Lighthouse Register, 1896, January to December.
Barbados - - - -	J. R. Bovell - - -	wo observations daily, 1896, March to December; 1897,
Beyrout (Lee Observatory) -	R. H. West, M.A. - - -	, 1896, March to December; 1897, January, February.
Cape Pembroke (Falkland Islands)	G. K. Broom, Lightkeeper - -	Lighthouse Register, 1896, January to December.
Cape Spartel (Tangier) - -	E. C. Hathaway, Lloyd's Signalman.	Two observations daily, 1896, March to December; 1897, January, February.
Cyprus (Famagusta) - -	G. Eliades - - -	„ „ „ „ January to December.
„ (Kyrenia) - -	P. Michaelides - - -	„ „ „ „ „ „
„ (Larnaca) - -	C. Perini - - - -	„ „ „ „ „ „
„ (Limassol) - - -	Luigi Béraud - - -	„ „ „ „ „ „
„ (Nicosia) - -	E. Ioannides - - -	„ „ „ „ „ „
„ (Papho) - -	E. A. Malliotis and M. Theodorides	„ „ „ „ „ „
Fiji - - - -	Captain C. E. Bird, R.M.S. "Warrimoo."	Notes on hurricane of March 6 to 8, 1896.

George Town (British Guiana) -	Robert Ward - - -	Two observations daily, 1896, February to December; 1897, January, February.
„ „ „ „ -	„ „ - - -	Daily record of sunshine, 1896, February to December; 1897, January, February.
Gibraltar - - - -	Sergeant A. W. Harwood, Med. Staff Corps.	Two observations daily, 1896, March to December; 1897, January, February.
Gold Coast (Aburi) - -	Assistant Colonial Surgeons -	Two observations daily, 1893, November, December; 1896, January to December; 1897, January, February.
„ „ (Acera) - -	„ „ „ - -	Two observations daily, 1893, November, December; 1896, January to December; 1897, January, February.
„ „ (Adda) - -	„ „ „ -	Two observations daily, 1896, January to December; 1897, January.
„ „ (Axim) - -	„ „ „ -	„ „ „ „ January to December; 1897, January.
„ „ (Cape Coast Castle) -	„ „ „ -	Daily rainfall, 1896, January to December; 1897, January, February.
„ „ (Kubé Kur) - -	„ „ „ -	One observation daily, 1896, March and April.
„ „ (Kwitta) - -	„ „ „ -	Two observations daily, 1896, January to December; 1897, January, February.
Lagos - - - -	S. W. Davies and T. B. Wright -	„ „ „ „ March to December; 1897, January, February.
Malden Island - - -	- - - - -	„ „ „ 1895, August to December; 1896, January.
Mojanga (Madagascar) -	S. C. Knott - - -	„ „ „ 1896, September to December; 1897, January.
Namirembe, Mengo, Uganda -	Rev. A. J. Pike - - -	One observation daily, 1895, December; 1896, January to December.
St. Helena - - -	H. S. Hands - - -	„ „ „ 1896, February to December; 1897, January, February.
„ - - -	„ - - -	Continuous record of wind (direction and velocity), 1896, March to December; 1897, January, February.
„ (James Town) -	P. Clifford and A. E. Broadway -	Daily rainfall, 1896, February to December; 1897, January, February.
„ (Mount Pleasant) -	T. C. Barker - - -	„ „ „ „ „ „ „ „ „
St. Kitts (Basseterre) - -	E. A. Hancock, F.C.S. - -	Two observations daily, 1896, January to June.
Sierra Leone - - -	G. A. Coker and Z. Grant -	„ „ „ „ March to December; 1897, January, February.
Sombrero - - -	J. A. Richardson and A. L. Richardson.	Lighthouse Register, 1895, October to December; 1896, January to September.
Suva (Fiji) - - -	J. D. W. Vaughan, F.R.Met. Soc., F.R.G.S.	One observation daily, 1896, March to November.

LIST OF DOCUMENTS—*continued.*

Place.	Observer.	Nature of Observations.
Teneriffe (Sitio de Cullen) -	A. F. Perry - - -	Two observations daily, 1896, March to December; 1897, January, February.
„ „ „ - -	„ - - -	Continuous record of pressure, 1896, February to August, November, December; 1897, January, February.
„ „ „ - -	„ - - - -	Continuous record of temperature, 1896, February to August, November, December; 1897, January, February.
Tobago - - - -	Quinten H. Spicer - - -	Two observations daily, 1896, February to May, July to October.
Tongoa (New Hebrides) - -	A. Cronstedt - - -	„ „ „ „ February to September.
Trinidad - - - -	J. H. Hart, Supt. Botanic Gardens -	„ „ „ „ January to December.
„ - - - -	„ „ „ „ -	Daily record of sunshine, 1896, February to December.

APPENDIX XIII.

Additions to the Library during the Year ending 31st March 1897.

Aachen, Meteorologische Station.—Deutsches meteorologisches Jahrbuch für 1895. Meteorologische Station I. Ordnung in Aachen. Ergebnisse der meteorologischen Beobachtungen. Herausgegeben . . . von P. Polis. Jahrg. 1. la. 4°. Aachen, 1896.

——— ——— Ergebnisse der 1896 in Aachen von der meteorologischen Station Aachen des Königl. Preuss. Meteorologischen Instituts angestellten Beobachtungen. sm. f°. Sheet.

Abels, H.—[On the density of snow at Ekaterinburg.] la. 4°. St. Pétersbourg, 1896. (*Mém. Acad. Imp. Sc. St. Pétersb.*, 8e. *série, Cl. Phys.-Math.*, iii., *No.* 9.)
In the Russian language.

Abercromby, Hon. R.—Three essays on Australian weather. 8°. Sydney, 1896.

Contains—

Moving anticyclones in the southern hemisphere. By H. C. Russell. (*Quart. Journ. R. Meteor. Soc.*, xix., 1893, *p.* 24.)

An essay on southerly bursters. By H. A. Hunt. (*Journ. R. Soc. N.S.W.*, xxviii., 1894.)

Types of Australian weather. By H. A. Hunt.

* ‖ ——— First report of the thunderstorm committee. On the photographs of lightning flashes received by the Royal Meteorological Society. la 8°. (*Quart. Journ. R. Meteor. Soc.*, xiv.)

* ‖ ——— On visibility. la. 8°. (*Quart. Journ. Meteor. Soc.*, 1877, *Jan.*)

* ‖ ——— On the general character, and principal sources of variation, in the weather at any part of a cyclone or anticyclone. la. 8°. (*Quart. Journ. Meteor. Soc.*, 1877, *Jan.*)

* ‖ ——— On the application of harmonic analysis to the reduction of meteorological observations, and on the general methods of meteorology. (*Quart. Journ. Meteor. Soc.*, 1878, *July*).

* ‖ ——— On a method of sometimes determining the amount of the variation of the barometer on any particular day. la. 8°. (*Quart. Journ. Meteor. Soc.*, 1878, *Oct.*)

‖ **Aitken, John.**—Notes on clouds. 8°. (*Proc. R. Soc. Edinb.*, 1895–96, *p.* 93.)

‖ **Albert Ier., Prince de Monaco.**—Sur la troisième campagne scientifique de la Princesse Alice. 4° (*Compt. rend. acad. sc. Paris*, 123, 1896, *p.* 1043.)

[Algiers, Service Météorologique du Gouvernement Général de l'Algérie.]—Bulletin météorologique de l'Algérie. 1896, Jan. 1–Dec. 31. sm. f°. Sheets.

[Allahabad, Meteorological Office.]—Brief sketch of the meteorology of the North-Western Provinces and Oudh and adjacent parts of Rajputana and the Panjab. 1895. sm. f°. s.l.e.a.

American Meteorological Journal.—A monthly review of meteorology. Vol. xii., 1895–96. la. 8°. Boston, s.a.

Amsterdam, Kon. Nederlandsch Aardrijkskundig Genootschap.—Tijdschrift. Tweede serie. Deel xiii. 8°. Leiden, 1896.

‖ **Angelitti, F.**—Determinazioni assolute della declinazione magnetica nel R. Osservatorio di Capodimonte eseguite negli anni 1893–96. la. 8°. (*Rend. R. Accad. Sc. Fis. Mat. Napoli, Fasc.* 12°, *Dic.*, 1896.)

Note.—Books marked * have been acquired by purchase; the others are donations from institutions, societies, or authors. Those marked ‖ are excerpt papers, extra copies of which have been separately printed.

In some cases additional publications have been received besides those specified, but only completed volumes or years are given here.

"**Antarctic.**"—Journal, notes and addresses on the voyage of the Norwegian S.S. "Antarctic" to the South Polar Seas in the years 1894–95. la. 8°. Melbourne, s.a. (*Advance Sheets Trans. R. Geogr. Soc. Australasia.*)

Archibald, E. D.—The height of the neutral plane of pressure and depth of monsoon currents in India. la. 8°. (*Quart. Journ. R. Meteor. Soc.*, N.S., x., 1884, *p.* 123.)

Azambuja, G. A. de.—Annuario do Estado do Rio Grande do Sul., 1897. Anno. 13. sm. 8°. Porto Alegre, 1896.

Baltimore, Maryland State Weather Service.—The climatology and physical features of Maryland. Second biennial report of the Maryland State Weather Service for the years 1894 and 1895. la. 8°. Baltimore, 1896.

——— ——— Monthly report, v., 1895–96. 4°. s.l.e.a.

[**Bangalore, Mysore Government Meteorological Department.**]—Meteorological results of the observations taken at the Bangalore, Mysore, Hassan, and Chitaldroog Observatories, for the years 1893 and 1894. By J. Cook. la. 4°. Bangalore, 1896.

Batavia, Magnetical and Meteorological Observatory.—Observations. Vol. xvii., 1894. f°. Batavia, 1895.

[**Batavia, Observatorium.**]—Regenwaarnemingen in Nederlandsch-Indië. xvi., Jaarg, 1894. 8°. Batavia, 1895.
Title and preface in the English language also.

Bathurst, Gambia.—Comparative rainfall, Colony of the Gambia, 1892–96, and meteorological observations, 1896. sm. f°. Sheet.

* **Bebber, W. J. van.**—Die Beurtheilung des Wetters auf mehrere Tage voraus. 8°. Stuttgart, 1896.

* ——— Katechismus der Meteorologie. Dritte Auflage, gänzlich umgearbeitet von W. J. van Bebber. sm. 8°. Leipzig, 1893.

Belize, Public Hospital. — Meteorological observations. 1896, Jan.–Dec. sm. f°. Sheets.

——— **St. Joseph's Observatory.**—Summary of meteorological observations. 1896, Jan.–Dec. 4°. Sheets. (*The Angelus, Belize*, 1896–97.)

‖ **Bergmann, R.**—Observations météorologiques faites par M. le Baron Toll et M. le lieutenant de la marine Chileiko en 1893, pendant l'expédition aux iles de la Nouvelle Sibérie et le long du littoral de l'océan glacial. la. 4°. St. Pétersbourg, 1895. (*Mém. Acad. Imp. Sc. St. Pétersb.*, viii. *sér.*, *Cl. phys.-math.*, ii., *No.* 3.)
In the Russian language.

Berlin, Deutsche Meteorologische Gesellschaft.—Berliner Zweigverein der Deutschen meteorologischen Gesellschaft. 13. Vereinsjahr, 1896. 8°. Berlin, 1896.

‖ ——— **Königlich Preussisches Meteorologisches Institut.**—Witterung nach den Beobachtungen des königlichen meteorologischen Instituts. 1896, Jan.–Dec. la. 4°. (*Statist. Korresp.*)

Bermuda, Registrar General's Office.—Report of the Registrar General for the year 1895. sm. f°. s.l.e.a.

‖ **Birmingham, Observatory of the Birmingham and Midland Institute.**—Records of meteorological observations taken at the Observatory of the Birmingham and Midland Institute. By A. Cresswell. Jan. 1891 to June 1892. July 1893 to Dec. 1895. 3 vols. 8°. (*Proc. Birmingham Nat. Hist. Phil. Soc.*, ? *and* ix., 1895, x., 1896.)

* **Bixby, W. H.**—Wind pressures in engineering construction. f°. (*Engineering News, New York*, xxxiii., 1895, *Mch.* 14, *p.* 175.)

‖ **Blasius, W.**—In which direction should cities in our latitude extend in order to secure to their populations pure air and thereby health. Read before the Amer. Phil. Soc., Philadelphia, 1884. 8°.

——— Seeschiffe im Kampfe mit Orkanen. Eine Vertheidigung gegen eine Kritik im "Globus" von G. Schott (Deutsche Seewarte). 8°. Braunschweig, 1894.

‖ ——— The U.S. Signal Service Bureau: Its methods and results. 8°. (*Proc. Amer. Phil. Soc.*, 1887, *p.* 179.)

‖ ——— Was sind eigentlich Cyclone und wie entstehen sie? 8°. Braunschweig, 1897. (*Jahresb. Ver. Naturw. Braunschweig*, 1896, *p.* 133.)

Bolton.—Annual report of the Museums and Meteorological Observatory for 1896. 8°. Bolton, s.a.

[Bombay, Meteorological Office.]—Brief sketch of the meteorology of the Bombay Presidency in 1895–96. f°. s.l.e.a.

——— **Government Observatory.**—Magnetical and meteorological observations at the Government Observatory, Bombay, 1895. f°. Bombay, 1896.

——— ——— Report on the condition and proceedings of the Government Observatory, Colaba, for the year 1895–96. f°. (Bombay), s.a.

‖ **[Boston, Mass., Weather Bureau.]**—Observations of the New England Weather Service for the year 1895. la. 4°. (*Ann. Astr. Obs. Harvard Coll.*, xli., *No.* 4, *p.* 95.)

* **Bouquet de la Grye, [A.].** — Observations météorologiques [à l'Ile Campbell.] 4°. (*Recueil de Mém. relatifs à l'obsn. du Passage de Vénus sur le Soleil*, iii., 1re *partie*, 1882, *p.* 299.)

Boyer, H. B.—Atmospheric circulation in tropical cyclones, as shown by movements of clouds. la. 8°. s.l.e.a.

Bremen, Meteorologische Station I. Ordnung. — Deutsches meteorologisches Jahrbuch für 1895. Ergebnisse der meteorologischen Beobachtungen im Jahre 1895 und in dem Lustrum 1891–95. Herausgegeben von Dr. P. Bergholz. Jahrg. vi. la. 4°. Bremen, 1896.

Brisbane, Post and Telegraph Department, Meteorological Branch.—Brisbane Observatory, Wickham Terrace. Meteorological synopsis. 1895–96, Jan.–Dec. f°. Sheets. (*Suppl. Queensland Gov. Gazette.*)

——— ——— ——— Climatological table. 1895, Jan.–Dec. sm. f°. Sheets.

——— ——— ——— Table of rainfall. 1895, Jan.–Dec. f°. Sheets.

Brussels, Observatoire Royal.—Bulletin météorologique. 1896, Jan. 1–Dec. 31. f°. Sheets.

Bucharest, Institutul Meteorologic al Romaniei.—Analele . . . de S. C. Hepites. Tom. xi., 1895. la. 4°. Bucuresti, 1896.

In the French language also.

——— ——— Buletin meteorologic. Anul ii., 1896. Jan. 1–Dec. 31. la. 4°. Sheets.

——— ——— Buletinul observatiunilor meteorologice din Romania de S. C. Hepites. Anul iv., 1895. sm. f°. Bucuresci, 1896.

Budapest, Kön. Ung. Naturwissenschaftliche Gesellschaft.—Erdmagnetische Messungen in den Ländern der Ungarischen Krone in den Jahren, 1892–94. Im Auftrage der Ung. Akad. der Wissensch. ausgeführt von Ignatz Kürlander. la. 4°. Budapest, 1896.

Cafiero, F.—Sul clima di Riposto.

See Riposto, Osservatorio Meteorologico del R. Istituto Nautico.

Cairo, Ministère de l'Intérieur. Administration des Services Sanitaires et d'Hygiène Publique.—Bulletin hebdomadaire. 11me année, 1896, Nos. 1–52. Suppl. au Journ. Officiel, 1896–97. la. 4°.

[Calcutta, Meteorological Office, Bengal.]—Bay of Bengal weather chart. 1896, Jan. 1–April 30, Nov. 1–Dec. 31. sm. f°. Sheets.

——— ——— May to October are included in the "Bay of Bengal and Bengal Daily Weather Report."

——— ——— Bay of Bengal and Bengal daily weather report. May 1–Oct. 31, 1896. sm. f°. Sheets.

These reports are only published during the rainy season.

(——— ———) Meteorological and rainfall table of the Province of Bengal for the months of January to December, 1896, with annual tables. sm. f°. Sheets.

——— ——— Meteorological summary for the monsoon period of 1896. sm. f°. s.l.e.a.

[——— ———] Summary of the meteorology of Bengal for the year 1895. sm. f°. s.l.e.a.

——— ——— **India.**—Abstract of the results of meteorological observations taken at the Alipore Observatory in the months of Jan.–Dec. 1896. sm. f°. Sheets.

——— ——— Abstract of the results of the barometric and thermometric observations taken at the Meteorological Office, Chowringhee. 1896, Jan.–Dec. sm. f°. Sheets.

——— ——— Administration report of the Meteorological Reporter to the Government of Bengal for the years 1893–96. f°. s.l.e.a.

Calcutta, Meteorological Office, India.—India daily weather report. 1896, Jan. 1–Dec. 31. f°. Sheets.

[——— ———] The India weather review for the year 1895. f°. Calcutta, 1896.

[——— ———] Memorandum on the snowfall in the mountain districts bordering Northern India, and the abnormal features of the weather in India during the past year, with a forecast of the probable character of the south-west monsoon rains of 1896. f°. (Simla, 1896.)

(——— ———) Rainfall of India. Fifth year. 1895. sm. f°. Calcutta, 1896.

(——— ———) Report on the administration of the Meteorological Department of the Government of India in 1895–96. f°. s.l.e.a.

——— ——— Results of the meteorological observations taken at the Alipore Observatory, from 5th January 1896 to 2nd January 1897. sm. f°. Sheets.

——— ——— Results of the barometrical and thermometrical observations taken at the Meteorological Office, Chowringhee, from 5th January 1896 to 2nd January 1897. sm. f°. Sheets.

[——— ———] Weather chart of the Indian monsoon area. 1895, Jan. 1–Dec. 31. f°. Sheets.

[——— **Surveyor-General of India.**]—General report on the operations of the Survey of India Department . . . during 1894–95. sm. f°. Calcutta, 1896.

‖ **Callendar, H. L.**—Preliminary results of observations of soil temperatures with electrical resistance thermometers, made at the McDonald Physics-Building, McGill University, Montreal. la. 8°. (*Trans. R. Soc. Canada, 2nd series*, i., *section* iii., 1895.)

Cambridge (Mass.), Astronomical Observatory of Harvard College.—Annals. Vol. xxx., Part iv. Observations made at the Blue Hill Meteorological Observatory, Mass., U.S.A., under the direction of A. L. Rotch. Discussion of the cloud observations by H. H. Clayton. la. 4°. Cambridge, Mass., 1896.

——— ——— Annals. Vol. xl., Part v. Observations made at the Blue Hill Meteorological Observatory, Mass., U.S.A., in the year 1895. Under the direction of A. L. Rotch. la. 4°. Cambridge, 1896.

* **Capron, J. R.**—Auroræ : their characters and spectra. 4°. London, 1879.

Carlsruhe, Centralbureau für Meteorologie und Hydrographie.—Deutsches meteorologisches Jahrbuch. Grossherzogthum Baden. Die Ergebnisse der meteorologischen Beobachtungen im Jahre 1895. Zugleich ii. Theil des Jahresb. . . . . la. 4°. Karlsruhe, 1896.

——— ——— Jahresbericht . . . mit den Ergebnissen der meteorologischen Beobachtungen und der Wasserstandsaufzeichnungen am Rhein und an seinen grössern Nebenflüssen für das Jahr 1895. la. 4°. Karlsruhe, 1896.

——— ——— Niederschlagsbeobachtungen der meteorologischen Stationen im Grossherzogthum Baden. 1896, 1–2 Halb. 1896, 1–2 Halb. 4 vols. la. 4°. Karlsruhe, 1895–97.

——— ——— Uebersicht der Ergebnisse der an den badischen meteorologischen Stationen angestellten Beobachtungen, nebst Wasserstandsaufzeichnungen an den wichtigsten Hauptpegeln des Rheins. 1896, Jan.-Dez. f°. Sheets.

* **Chambers, G. F.**—The story of the weather : simply told for general readers. sm. 8°. London, 1897.

‖ **Chemnitz, K. Sächsisches Meteorologisches Institut.**—Abhandlungen. Heft 1. Vier Abhandlungen über Periodizität des Niederschlages, theoretische Meteorologie und Gewitterregen von P. Schreiber. la. 4°. Leipzig, 1896. (*Civilingenieur*, 1892–96.)

——— ——— Jahrbuch . . . für das Jahr 1894. Jahrg. xii. der neuen Reihe. Zugleich Deutsches Meteorologisches Jahrbuch für 1894. Beobachtungssystem des Königreiches Sachsen. la. 4°. Chemnitz, 1895.

‖ **Chree, C.**—Applications of physics and mathematics to seismology. 8°. (*Phil. Mag.*, 1897, *Mch.*, *p.* 173.)

‖ ——— Comparison and reduction of magnetic observations. Report of the Committee . . . drawn up by the Secretary (Dr. C. Chree). 8°. (*Rep. Brit. Assoc. Advanc. Sc.*, 1896.)

(Chree, C.)—Description of the Kew Observatory. 8°. (*From the "Record" of the R. Soc.*)

‖ ——— Observations on atmospheric electricity at the Kew Observatory. 8°. (*Proc. R. Soc.*, 60, 1896, *p.* 96.)

Christiania, Norsk Meteorologisk Institut.—Oversigt over Luftens Temperatur og Nedbφren i Norge. 1890–92, 1894, 1895. 5 parts. 8°. s.l.e.a.

——— **Norwegisches Meteorologisches Institut.**—Jahrbuch . . . für 1894, 1895. Herausgegeben von H. Mohn. 2 vols. sm. f°. Christiania, 1896.

* **Ciel et Terre.**—Revue populaire d'astronomie, de météorologie, et de physique du globe. xviie année; 1896–97. 8°. Bruxelles, s.a.

Coimbra, Observatorio Meteorologico [e Magnetico da Universidade].—Observações meteorologicas e magneticas. Vols. xxxiii.–xxxiv. 1894–95. 2 vols. f°. Coimbra, 1896.

‖ **Colombo, Surveyor General's Office.**—Report on the meteorology of Ceylon for 1895. sm. f°. (*Ceylon Administr. Rep.*, 1895, *Part* ii.)

‖ ——— ———- Results of meteorological observations in Ceylon during the months of January to December 1895. f°. Sheets. (*Suppl. Ceylon Gov. Gazette*, 1895–96.)

‖ ——— ——— Return of rainfall in Ceylon during 1895, and the means during different periods. la. f°. Sheet. (*Suppl. Ceylon Gov. Gazette*, 1896, *May* 22.)

* **Colonial Office List** for 1896: comprising historical and statistical information respecting the Colonial dependencies of Great Britain, . . . Compiled by John Anderson. 8°. London, s.a.

Constantinople, Observatoire Impérial Météorologique.—Bulletin météorologique et séismique. 1895, Jan.–Dec. sm. f°. Constantinople, 1895.

Copenhagen, Dansk Meteorologisk Institut.—Bulletin météorologique du Nord, publié par les Instituts météorologiques de Norvége, de Danemark et de Suède. Année 1896. oblong 8°. Copenhague, s.a.

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APPENDIX XIV.

ACCOUNT of RECEIPTS and PAYMENTS for the year ending 31st March 1897.

RECEIPTS.	£	s.	d.	PAYMENTS.	£	s.	d.	£	s.	d.
Balance from year 1895–96 -	1,172	2	11	ADMINISTRATION:						
Parliamentary Vote - -	15,300	0	0	Payment of Council -	991	5	0			
Repayment of expenses charged under—				Secretary - -	800	0	0			
				Salaries and wages -	945	8	0			
	£	s.	d.	Rent, fuel, and lighting	716	16	7			
(1.) Incidental expenses -	36	13	9	Incidental and contingent expenses -	227	19	3			
(2.) Observatories -	25	2	9	Furniture and fittings	87	19	9			
				Expenses incidental to International Meteorological Congress -	23	10	8			
	61	16	6	Pensions - -	144	0	0			
								3,936	19	3
SUPPLY OF INFORMATION:				SPECIAL RESEARCHES:						
Daily Weather Charts and Forecasts -	261	17	4	Salaries and other charges - -	-	-	-	820	18	5
6 p.m. Charts -	25	0	0	LAND METEOROLOGY:						
Reports for Press Agencies, &c. -	111	18	6	Observatories and stations, including remuneration of observers - -	2,217	6	5			
Telegrams sent abroad - -	201	14	1	Salaries: —Discussion and reduction of observations, &c. -	1,373	7	6			
	600	9	11					3,590	13	11
SALE OF INSTRUMENTS, &c.:				WEATHER INFORMATION AND FORECASTS:						
Royal Navy account - -	7	5	9	Telegraphic reports and storm warnings, remuneration of observers, &c. -	2,685	2	6			
Mercantile Marine account -	16	6	0	Salaries: — Preparation and issue of reports and forecasts -	1,874	4	6			
M.O. (Stations) account -	35	2	0					4,559	7	0
	58	13	9	INSPECTIONS:						
Repayment of Miscellaneous Commissions executed for Colonial and Foreign Institutions, &c. - -	198	6	8	Salaries and travelling expenses - -	-	-	-	445	17	0
Commission charged on work done for Colonies, &c. -	12	1	8	OCEAN METEOROLOGY:						
				Salaries:—Discussion and reduction of observations - -	1,607	1	2			
				Expenses incidental to the supply of instruments:—						
				Proportion for care and issue of instruments - -	200	0	0			
				Royal Navy - -	378	10	8			
				Mercantile Marine -	224	13	7			
				Distant island and coast stations -	10	10	0			
								2,420	15	5
				Miscellaneous Commissions executed for Colonial and Foreign Institutions, &c. - -	-	-	-	199	15	2
				BALANCE:						
				Cash at Bank -	1,372	0	5			
				„ at Office -	57	4	10			
								1,429	5	3
£	17,403	11	5				£	17,403	11	5

In the year 1896–97 the sum of 1,725*l.* 8*s.* 7*d.* was paid to the Post Office on account of inland and foreign telegrams, allowances to telegraph clerks, rental of private wires, &c.

APPENDIX XV.

List of the Principal Papers printed in various Reports issued by the Office from the Year 1866.

I.—Daily Weather Report.

Year.	Page.	——
1896 (July to Dec.).	1	Mean Values of Barometric Pressure for each Month and for the Whole Year, derived from Observations made at 8 a.m. daily during the 25 Years 1871–95.
1896	2 and 3	Mean Values of the Dry Bulb and Wet Bulb Temperatures for each Month and for the Whole Year, derived from Observations made at 8 a.m. daily during the 25 Years 1871–95.
„	4 and 5	Mean Values of the Daily Maximum and Minimum Temperatures, and of the Maximum and Minimum combined, for each Month and for the Whole Year, derived from Observations extending over the 25 Years 1871–95.
„	6 and 7	Extremes of the Daily Maximum and Minimum Temperatures for each Month and for the Whole Year, derived from Observations extending over the 25 Years 1871–95.
„	8	Mean Rainfall for each Month and for the Whole Year—derived from Observations extending over the 30 Years 1866–95.
„	9	Mean Numbers of Hours of Bright Sunshine, with the Percentages of Possible Duration, derived from Observations extending over the 15 Years 1881–95.

II.—Weekly Weather Report.

Year.	Page.	——
1884	V.	Table A.—Showing for each Degree of Latitude, from 49° N. to 58° N. the Total Number of Hours during which the Sun is above the Horizon, in each Month of the Four Quarters of the Year.
„	VI.	Table B.—Showing for each Degree of Latitude, from 49° N. to 58° N. the Total Number of Hours during which the Sun is above the Horizon, in each Week of the Year.
1889	[1–9]	Summaries of Rainfall and Mean Temperature, for the First, Second, Third, and Fourth Quarters, and for the Whole Year, during the 24 Years 1866 to 1889. [Contains Separate Yearly Values from the year 1866.]
1895	VI.–VII.	Mean Values of the Daily Maximum and Minimum Temperatures, and of the Maximum and Minimum combined, for each Month and for the Whole Year, derived from Observations extending over the 25 Years 1871–95.
„	VIII.	Mean Rainfall for each Month and for the Whole Year, derived from Observations extending over the 30 Years 1866–95.
„	IX.	Mean Numbers of Hours of Bright Sunshine, together with the Per-centages of the Possible Duration, for each Month and the Whole Year, derived from Records extending over the 15 Years 1881–95. [For Separate Yearly Values for 1866–89, *see* 1889 [1–9].]
„	[17]	Table I.—Showing for each District, during each of the Three Lustra, and the whole Period comprehended in the 15 Years 1881–95, the Mean Aggregate numbers of rainy days from the beginning of the Year to the end of each week in the Year.

Year.	Page.	——
1895	[23]	Table II.—Showing for each District, during each of the Three Lustra, and the whole Period comprehended in the 15 Years 1881–95, the Mean Aggregate Amounts of Rainfall, from the beginning of the Year to the end of each week in the Year.
„	[27]	Table III.—Showing for each District, during each of the Three Lustra, and the whole Period comprehended in the 15 Years 1881–95, the Mean Aggregate Values for Accumulated Heat above 42° F., from the beginning of the Year to the end of each week in the Year.
„	[32]	Table IV.—Showing for each District, during each of the Three Lustra, and the whole Period comprehended in the 15 Years 1881–95, the Mean aggregate Values for Accumulated Heat below 42° F., from the beginning of the Year to the end of each week in the Year.
„	[37]	Table V.—Showing for each District, during each of the Three Lustra, and the whole Period comprehended in the 15 Years 1881–95, the Mean Aggregate Numbers of Hours of Bright Sunshine from the beginning of the Year to the end of each week in the Year.
„	[42]	Table VI.—Showing for each District, during each of the Three Lustra, and the whole Period comprehended in the 15 Years 1881–95, the Mean Per-centages of the possible amount of Bright Sunshine, from the beginning of the Year to the end of each week in the Year.
„	[47]	Table showing in Degrees Fahrenheit for each District, during each of the Three Lustra, and the whole Period comprehended in the 15 Years 1881–95, the Mean Temperature of the Air, for each week in the Year.
1896	[1–9]	Summaries of Rainfall and Mean Temperature for the First, Second, Third, and Fourth Quarters, and for the Whole Year, during the 31 Years 1866–96. [For Separate Yearly Values for 1866–89, *see* 1889 [1–9].]

III.—Monthly Weather Report.

Year.	Page.	——
1884	[iii.]	Table showing for each Month and for each Degree of Latitude from 18° N. to 49°N. the Total Number of Hours during which the Sun is above the Horizon.
„	[i.]	On London Rain. By W. J. Russell, Ph.D., F.R.S.
„	[ii.]	On the Amount of Carbonic Acid in London Air. By W. J. Russell, Ph.D., F.R.S.
1885	[i.]	On the Impurities in London Air. By W. J. Russell, Ph.D., F.R.S.
„	[ii.]	Table showing the Mean Monthly and Annual Rainfall at the Weekly and Monthly Weather Report Stations for the 20 Years 1866 to 1885.

IV.—Quarterly Weather Report.

Year.	Page.	——
1869	43	Factors for Calculation of Gradients.
„	[1]	Notes on Easterly Gales, by R. H. Scott.
1870	iii.	Description of Observatories, with illustrations of thermometer screens.
„	[7]	Mean Barometrical Pressure at Telegraphic Reporting Stations, 1866–70.

Year.	Page.	——
1870	[23]	Bessel's Paper on the Determination of the Law of a Periodical Phenomenon. Translated from the Astronomische Nachrichten, 136, for May, 1828.
1871	[7]	Discussion of Anemometrical Results for Orkney, 1863–68.
„	[59]	Constants for the Determination of the Monthly March of Atmospherical Pressure, &c. at the Seven Observatories for 1869–70.
1872	[13]	Discussion of the Anemometrical Results at Bermuda from 1st April 1859 to 31st March 1863.
1873	[13]	Rainfall of the London District for Sixty Years, 1813–72. By G. Dines, F.M.S., [with diagram].
1874	[26]	On the Winds at Liverpool, by W. W. Rundell.
1875	[1]	Observations taken at Nine Stations of the Second Order, [1875].
„	[89]	Mean Monthly Results for the Seven Observatories for the Lustrum, 1871–75.
1876	[13]	Report on the Reduction of Greenwich Curves for 1875 to a Common Standard with those of Kew [with 25 plates].
„	[20]	Results of Observations made at the Pagoda, Kew Gardens, to Determine the Influence of Height on Temperature, &c. By R. H. Scott, F.R.S. [4 plates.]
„	[39]	Comparison of Results obtained by means of the Harmonic Analyser, with similar Results got from Measurement and Numerical Calculation for the Seven Observatories.
1877	[13]	On the Diurnal Range of Rainfall at the Seven Observatories in connexion with the Meteorological Office, 1871–80. By R. H. Scott, F.R.S. [5 plates.]
„	[35]	Report on Evaporimeters. By W. N. Shaw, M.A. [2 plates.]
1878	[13]	On the Computation of the Quantity of Heat in excess of any Fixed Base Temperature, received at any place during the course of the Year, &c. By Lieut.-Gen. Strachey, R.E., F.R.S.
1879	[41]	Report on Hygrometric Methods, &c. Part I. By W. N. Shaw, M.A.
1880	[13]	Report on Experiments made at the Kew Observatory with Thermometer Screens of different patterns during 1879, 1880 and 1881, by G. M. Whipple, Superintendent.
„	[19]	Tables and Diagrams illustrating the Diurnal Range of Barometric Pressure in the British Isles during the Years 1876–80. By F. C. Bayard, L.L.M., F.R. Met. Soc. [5 plates.]

V.—Report of the Meteorological Committee of the Royal Society.

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1867	27	A Description of the Self-Recording Instruments recently erected by the Meteorological Committee of the Royal Society in varions parts of the United Kingdom [with plates].
1869	25	Note upon a Self-registering Thermometer adapted to Deep-Sea Soundings, by W. A. Miller, M.D., Treasurer and V.P.R.S., extracted from Proceedings of Royal Society, vol. XVII., p. 482.
„	32	On the Principle of the Pantagraph, designed by F. Galton.
„	36	Description of a Self-Recording Rain-gauge, invented by Robert Beckley, of the Kew Observatory; made by James Hicks, London.
1870	25	Description of the Process by which the Traces of the Self-registering Instruments are reduced suitably for publication.
„	31	Description of the Pantagraph, designed by Mr. Galton.
1871	24	„ „ Trace Computer, designed by Mr. Galton.

Year.	Page.	——
1872	27	A Summary of the Results obtained from the Discussion of the Information for Square 3, being the Region of the Doldrums in the Atlantic. By Capt. H. Toynbee, Marine Superintendent.
1873	26	Summary of the General Course of Action taken at the Meteorological Congress at Vienna in 1873.
1874	33	The International Maritime Conference.
1876–77	31	Index of the Information existing in the Office for the entire Ocean [with charts].

Va.—Report of the Meteorological Council.

Year.	Page.	——
1877–78	21	Account of the Experiments on Atmospheric Electricity conducted at Kew Observatory. By Prof. J. D. Everett.
1879–80	28	On the Effect of Sluggishness on the Readings of Marine Barometers on Shore, by Prof. Stokes.
„	32	Description of the Card Supporter for Sunshine Recorders adopted at the Meteorological Office, by Prof. Stokes.
„	43	On the Methods available for the Determination of the Humidity of the Atmosphere, by Mr. W. N. Shaw.
„	46	Memorandum as to the Employment of the Harmonic Analyser in the Meteorological Office, by Prof. Stokes.
1880–81	25	On the Working of the Harmonic Analyser. [Prof. Stokes.]
„	27	Report on Fogs. [W. J. Russell.]
„	28	„ „ Hygrometers and Evaporimeters, presented to the Meteorological Council, May 10, 1881. [W. N. Shaw.]
„	33	Preliminary Report on the Photo-Nephograph. [W. de W. Abney.]
1881–82	25	On Fogs. [W. J. Russell.]
„	25	Preliminary Report on Hygrometry. [W. N. Shaw.]
„	29	Report on the Results of a Tentative Reduction of a Year's Electrograms at the Kew Observatory. [G. M. Whipple.]
1882–83	27	On the Results obtained by the use of the Harmonic Analyser.
1884–85	22	Note on Work done with the Harmonic Analyser.
1885–86	22	Memorandum on Cloud Photography, by Prof. Stokes, F.R.S.
1886–87	21	On the Distribution of Gales round the Coasts of the British Isles [for the 15 years, 1871–85].
„	23	Report on Occasional Telegrams received from Ben Nevis. [F. Gaster.]
„	24	Report on the Daily Weather Messages received from the United States (viâ Paris) during the three months January to March 1887. [F. Gaster.]
1887–88	22	On the History of the Severe Storms which visited the British Isles between August 1, 1882, and September 3, 1883, as traceable from the Atlantic Charts published by the Office. By Robert H. Scott, F.R.S., Secretary.
„	30	Abstract of Report on Hygrometric Methods, by W. N. Shaw, M.A., reprinted from the "Proceedings of the Royal Society," No. 262.
1888–89	22	Notes of some Results of an Examination of Atlantic Charts published by the Office, by R. H. Scott, F.R.S., Secretary.
„	27	Memorandum on the Measurement of Squalls shown on the Traces yielded by Robinson Anemometers of the "Standard" Pattern, by R. H. Curtis.
1889–90	24	Code of Regulations, &c. for conducting the work at the First Class Observatories, and the Examination thereof. [See also Report, 1868.]

Year.	Page.	——
1889–90	36	Note on Experiments on Pressure of Wind made by Mr. W. H. Dines.
„	46	Experiments with Violle's Actinometer Apparatus.
„	47	On the Work done with the Harmonic Analyser at the Meteorological Office.
1890–91	22	On Mr. Dines's Anemometer Experiments.
1891–92	23	On Anemometer Comparisons carried out by the aid of a Grant from the Meteorological Council, by W. H. Dines, B.A.
1892–93	21	On the Construction of the Anemometer recently erected for trial on the roof of the Meteorological Office, by W. H. Dines, B.A.
„	27	On the Harmonic Analysis of Hourly Observations of Air Temperatures at British Observatories, by Lieut.-Gen. R. Strachey, F.R.S.
1893–94	20	Report on the Performance of the Pressure-Tube Anemometer on the Roof of the Meteorological Office, by Mr. R. H. Curtis.
1894–95	22	Report to the Council of the University Extension College at Reading on Hay Harvest Forecasts during the Hay Harvest of 1894, by H. N. Dickson.
„	27	Report on the Comparisons made between two Pressure Tube Anemometers on the roof of the Meteorological Office, by Mr. R. H. Curtis.
1895–96	24	Note on Anemometer Experiments, by Mr. R. H. Curtis.

VI.—Hourly Readings of the Self-Recording Instruments of the Observatories in connexion with the Meteorological Office.

Year.	Page.	——
1883	[1]	Constants of formulæ expressing the mean daily range of temperature obtained by the use of the Harmonic Analyser.
1884	[1]	Tables and formulæ to facilitate the computation of harmonic coefficients. By Lieut.-General Strachey, R.E.

VII.—Hourly Means of the Readings obtained from the Self-Recording Instruments at the Five Observatories under the Meteorological Council.

Year.	Page.	——
1891	[1]	Tables of Hourly Sunshine Values, with Plates, for the Ten years 1881–90, for Seven Observatories.

VIII.—Meteorological Observations at Stations of the Second Order.

Year.	Page.	——
1891	[186]	Results of Observations at Stations of the Second Order for the Fifteen years, 1876–1890.

APPENDIX XVI.

LIST OF PUBLICATIONS issued under the Authority of the Meteorological Council.

OFFICIAL.

No. 1. Report of the Meteorological Committee for 1867. 1*s.*
2. Instructions for Meteorological Telegraphy. New Edition, 1891. Prepared for the use of observers exclusively.
3. Fishery Barometer Manual. (New edition, 1887.) 6*d.*
4. Charts showing the Surface Temperature of the South Atlantic Ocean in each Month of the Year. 2*s.* 6*d.*
5. Report of the Meteorological Committee for 1868. 5*d.*
6. Report of the Meteorological Committee for 1869. 10*d.*
7. Quarterly Weather Report for 1869.—Parts I. to IV. 5*s.* each.
8. Barometer Manual. (Out of print. See Nos. 3, 24, 40, 60, and 61.)
9. Quarterly Weather Report for 1870.—Parts I. to IV. 5*s.* each.
10. Report of the Meteorological Committee for 1870. 10*d.*
11. Contributions to our Knowledge of the Meteorology of Cape Horn and the West Coast of South America. 2*s.* 6*d.*
12. Currents and Surface Temperature of the North Atlantic Ocean, from the Equator to Lat. 40° N., for each month of the year, with a General Current Chart. 2*s.* 6*d.*
13. A Discussion of the Meteorology of that Part of the Atlantic lying North of 30° N., for the Eleven Days ending 8th February 1870. With Book of Charts, 5*s.*
14. Quarterly Weather Report for 1871.—Parts I. to IV. 5*s.* each.
15. Report of the Meteorological Committee for 1871. 10*d.*
16. Quarterly Weather Report for 1872.—Parts I. to IV. 5*s.* each.
17. Report of the Meteorological Committee for 1872. 1*s.*
18. Contributions to our Knowledge of the Meteorology of the Antarctic Regions. 2*s.*
19. Quarterly Weather Report for 1873.—Parts I. to IV. 5*s.* each.
20. Charts of Meteorological Data for Square 3. Lat. 0°—10° N. Long. 20° — 30° W., and Remarks to accompany the Monthly Charts, which show the Best Routes across the Equator for each Month, &c. 20*s.*
21. Report of the Proceedings of the Meteorological Congress at Vienna. 1873. 1*s.*
22. Report of the Meteorological Committee for 1873. 4*d.*
23. Report of the Proceedings of the Conference on Maritime Meteorology held in London, 1874. 2*s.*
24. Instructions in the Use of Meteorological Instruments. [Reprinted 1892.] (New edition in course of preparation.) 2*s.* 6*d.*
25. Quarterly Weather Report for 1874.—Parts I., II., and IV., 5*s.* each. Part III., 5*s.* 9*d.*

LIST OF PUBLICATIONS—*continued.*

No. 26. Report of the Meteorological Committee for 1874. 6*d.*
27. Charts of Meteorological Data for the Nine 10° Squares of the Atlantic which lie between 20° N. and 10° S., and extend from 10° to 40° W., with accompanying Remarks, ending with the Best Routes across the Equator. 24*s.*
28. Contribution to the Meteorology of Japan. By Staff-Commander Thomas H. Tizard, H.M.S. *Challenger.* 1*s.*
29. Report of the Meteorological Committee for 1875. 4*d.*
30. Quarterly Weather Report for 1875.—Parts I.—IV. 5*s.* each.
31. Report of the Meteorological Committee for 1876–7. 3*s.* 5*d.*
32. The Meteorology of the North Atlantic during August 1873, with 31 Synoptic Charts. With Book of Charts. 15*s.*
33. Quarterly Weather Report for 1876 (New Series).—Part I., 6*s.*; Parts II., III., and IV., 5*s.* each.
*33A. Meteorological Observations at Stations of the Second Order for the year 1876.
33B. Meteorological Observations at Stations of the Second Order for the year 1877.
34. Contributions to our Knowledge of the Meteorology of the Arctic Regions.—Vol. I.: Part I., 2*s.*; Part II., 10*s.*; Part III., 6*s.*; Part IV., 5*s.*; Part V., 6*s.*
35. Report of the Meteorological Council for 1877–8. 1*s.*
36. Report of the Proceedings of the Second International Meteorological Congress at Rome, 1879. 1*s.* 6*d.*
37. Report on the Meteorology of Kerguelen Island. By Rev. S. J. Perry, S.J., F.R.S. 3*s.*
38. Report of the Meteorological Council for 1878–9. 5*d.*
39. Meteorological Observations at Stations of the Second Order for the year 1878. 20*s.*
40. Aids to the Study and Forecast of Weather, by W. Clement Ley, M.A. 1*s.*
41. Report of the Meteorological Council for 1879–80. 1*s.*
42. Report of the Meteorological Council for 1880–81. 1*s.* 2*d.*
43. Meteorological Charts for the Ocean District adjacent to the Cape of Good Hope, with accompanying Remarks. Charts, 25*s.*; Remarks, 7*s.*
44. Report on the Gales experienced in the Ocean District adjacent to the Cape of Good Hope, between Lat. 30° and 50° S., and Long 10° and 40° E., by Capt. H. Toynbee, F.R.A.S. 7*s.* 6*d.*
45. Meteorological Observations at Stations of the Second Order for the year 1879. 20*s.*
46. Report on the Storm of October 13–14, 1881. By Robert H. Scott, F.R.S. 1*s.* 6*d.*
47. Rainfall Tables of the British Isles for 1866–80. Compiled by G. J. Symons, F.R.S. 7*s.* 6*d.*
48. Report of the Meteorological Council for 1881–2. 1*s.*
49. Quarterly Weather Report for 1879. (New Series.) Parts I., II., and III., 6*s.* each; Part IV., 5*s.* 6*d.* Appendices and Plates. 27*s.*
50. Quarterly Weather Report for 1880. (New Series.) Parts I. and II., 6*s.* each; Part III., 4*s.*; Part IV., 6*s.* Appendices and Plates. 28*s.*

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* The Observations at Stations of the Second Order for the years 1873–1875 will be found in the Quarterly Weather Reports for the respective years.

No. 51.* Hourly Readings from the Self-Recording Instruments at the Seven Observatories under the Meteorological Council, 1881. (New Series.) Part I., 10*s.* 6*d.* Parts II., III., and IV., 21*s.* each.

52. Quarterly Weather Report for 1877. (New Series.) Part I., 10*s.*; Part II., 5*s.*; Part III., 4*s.* 6*d.*; Part IV., 6*s.* Appendices and Plates. 27*s.*

53. Meteorological Atlas of the British Isles. 5*s.* 6*d.*

54. Hourly Readings from the Self-Recording Instruments at the Seven Observatories under the Meteorological Council, 1882. Parts I. and II., 20*s.* each; Part III., 22*s.* 6*d.*; Part IV., 26*s.*

55. Quarterly Weather Report for 1878. (New Series.) Parts I., II., III., and IV., 6*s.* each. Appendices and Plates. 28*s.*

56. Sunshine Records of the United Kingdom for 1881. 4*s.*

57. Meteorological Observations at Stations of the Second Order for the year 1880. 34*s.* 6*d.*

58. Report of the Meteorological Council for 1882–3. 10½*d.*

59. Charts showing the Surface Temperature of the Atlantic, Indian, and Pacific Oceans. 21*s.*

60. Principles of Forecasting by means of Weather Charts. By the Hon. Ralph Abercromby, F.R.Met.Soc. (Second edition.) 2*s.*

61. A Barometer Manual for the Use of Seamen. (Second edition.) 1*s.* 3*d.*

62. Monthly Weather Reports for 1884. Jan., Feb., March, May —Nov., 1*s.* 6*d.* each. April (with 2 Appendices), 2*s.* 6*d.* Dec., 1*s.* 9*d.*

63. Hourly Readings from the Self-Recording Instruments at the Seven Observatories under the Meteorological Council 1883. Parts I., II., and III., 21*s.* each; Part IV., 30*s.*

64. Report of the Meteorological Council for 1883–4. 1*s.* 2*d.*

65. Monthly Weather Reports for 1885. Jan. to Dec., 1*s.* 6*d.* each.

66. Meteorological Observations at Stations of the Second Order for the year 1881. 35*s.*

67. Report of the Meteorological Council for 1884–5. 4*s.* 4*d.*

68. Monthly Weather Reports for 1886. Jan. to Dec., 1*s.* 6*d.* each.

69. Meteorological Observations at Stations of the Second Order for the year 1882. 35*s.*

70. Hourly Readings from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1884. Part I., 12*s.*; Part II., 10*s.*; Part III., 10*s.* 6*d.*; Part IV., 15*s.*

71. Synchronous Weather Charts of the North Atlantic and the adjacent Continents. Aug. 1, 1882, to Sept. 3, 1883. Parts I. to IV. (33 sheets each.) 17*s.* each.

72. Report of the Meteorological Council for 1885–86. 8*d.*

73. Meteorological Observations at Stations of the Second Order for the year 1883. 30*s.*

74. Hourly Readings from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1885. Parts I. and II., 11*s.* each; Part III., 10*s.* 6*d.* Part IV., 12*s.*

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* For the years 1874–1880 the Hourly Readings were issued in lithographed form. Price 20*s.* per annum.

LIST OF PUBLICATIONS—*continued.*

No. 75. Report of the Meteorological Council for 1886–87. 8*d.*

76. Charts showing the Mean Barometric Pressure over the Atlantic, Indian, and Pacific Oceans. 10*s.* 6*d.* Supplementary Chart, 6*d.*

*77. Monthly Weather Reports for 1887. January to April, 1*s.* 6*d.* each. May to December, in wrapper, 12*s.*

78. Meteorological Observations at Stations of the Second Order for the year 1884. 32*s.*

79. Report of the Meteorological Council for 1887–88. 1*s.*

80. Daily Weather Charts for the period of six weeks ending June 25, 1885, to illustrate the tracks of two cyclones in the Arabian Sea. 10*s.*

81. Hourly Readings from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1886. Parts I., II., and III., 10*s.* 6*d.* each. Part IV., 12*s.* 6*d.*

82. Meteorological Observations at Stations of the Second Order for the year 1885. 31*s.*

83. Meteorological Observations at the Foreign and Colonial Stations of the Royal Engineers and the Army Medical Department. 1852–1886. 23*s.*

84. Report of the Meteorological Council for 1888–89. 5½*d.*

†85. Weekly Weather Report for the year 1888. Vol. V. Second Series. 4*d.* per week. With Appendices and Monthly Supplements, priced separately. Annual subscription, including Supplements and Appendices, post paid, 21*s.* 2*d.*

86. Weekly Weather Report for the year 1889. Vol. VI. Second Series. 6*d.* per week. With Appendices and Monthly Supplements, priced separately. Annual subscription, including Supplements and Appendices, post paid, 30*s.*

87. Weekly Weather Report for the year 1890. Vol. VII. Third Series. (For Price, &c., see No. 86.)

88. Meteorological Observations at Stations of the Second Order for the year 1886. 25*s.*

89. Meteorological Observations made at Sanchez, Samaná Bay, St. Domingo. 1886–88. By the late W. Reid, M.D. 8*s.* 6*d.*

90. Cyclone Tracks in the South Indian Ocean. From information compiled by Dr. Meldrum, C.M.G., F.R.S. 7*s.*

91. Report of the Meteorological Council for 1889–90. 7½*d.*

92. Meteorological Charts of the portion of the Indian Ocean adjacent to Cape Guardafui and Ras Hafún. 6*s.*

93. Harmonic Analysis of Hourly Observations of Air Temperature and of Pressure at British Observatories. 12*s.*

94. Hourly Means of the Readings obtained from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1887. 16*s.*

95. Meteorological Observations at Stations of the Second Order for the year 1887. 24*s.*

96. Weekly Weather Report for the year 1891. Vol. VIII., Third Series. (For Price, &c., see No. 86.)

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* Publication continued after this year as a Supplement to the Weekly Weather Report.

† The publication of the Weekly Weather Report began in February 1878, Annual subscription, 1878–1883, 12*s.* 6*d.*; 1884–1887, 21*s.* 2*d.*

No. 97. Hourly Means of the Readings obtained from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1888. 20*s*.

98. Ten Years Sunshine in the British Isles, 1881–90. 2*s*.

99. Report of the Meteorological Council for 1890–91. 5½*d*.

100. Weekly Weather Report for the year 1892. Vol. IX., Third Series. (For Price, &c., see No. 86.)

101. Meteorological Observations at Stations of the Second Order for the year 1888. 22*s*.

102. Report of the International Meteorological Conference at Munich in 1891. 1*s*. 6*d*.

103. Hourly Means of the Readings obtained from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1889. 15*s*.

104. Report of the Meteorological Council for 1891–92. 6*d*.

105. Hourly Means of the Readings obtained from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1890. 20*s*.

106. Meteorological Charts of the Red Sea. 21*s*.

107. Weekly Weather Report for the year 1893. Vol. X., Third Series. (For Price, &c., see No. 86.)

108. Meteorological Observations at Stations of the Second Order for the year 1889. 34*s*.

109. Report of the Meteorological Council for 1892–93. 8*d*.

110. Meteorological Observations at Stations of the Second Order for the year 1890. 34*s*.

111. Weekly Weather Report for the year 1894. Vol. XI., Third Series. (For Price, &c., see No. 86.)

112. Report of the Meteorological Council for 1893–94. 7½*d*.

113. Hourly Means of the Readings obtained from the Self-recording Instruments at the Five Observatories under the Meteorological Council, 1891. 32*s*. 6*d*.

114. Rainfall Tables of the British Isles, 1866–90. 6*s*.

115. Report of the International Meteorological Committee. Upsala, 1894. 1*s*.

116. Weekly Weather Report for the year 1895. Vol. XII., Third Series. (For Price, &c., see No. 86.)

117. Meteorological Observations at Stations of the Second Order for the year 1891. 30*s*.

118. Hourly Means of the Readings obtained from the Self-recording Instruments at the Five Observatories under the Meteorological Council, 1892. 21*s*.

119. Report of the Meteorological Council for 1894–95. 8½*d*.

120. Meteorological Observations at Stations of the Second Order for the year 1892. 27*s*.

121. Weekly Weather Report for the year 1396. Vol. XIII. Third Series. (For Price, &c., see No. 86.)

122. Report of the Meteorological Council for 1895–96. 8½*d*.

123. Meteorological Charts for the district between the Cape of Good Hope and New Zealand. (In the Press.)

124. Monthly Current Charts for the Indian Ocean, from Information collated and prepared in the Meteorological Office. Published by the Admiralty. 7*s*.

125. Meteorological Observations at Stations of the Second Order for the Year 1893. 27*s*.

LIST OF PUBLICATIONS—*continued.*

No. 126. Hourly Means of the Readings obtained from the Self-Recording Instruments at the Five Observatories under the Meteorological Council, 1893. 24*s.*

127. Report of the International Meteorological Conference. Paris, 1896. 1*s.*

128. Weekly Weather Report for the Year 1897. Vol. XIV., Third Series. (For Price, &c., see No. 86.)

129. Meteorological Observations at Stations of the Second Order for the Year 1894. 27*s.*

130. Report of the Meteorological Council for 1896–97. 8*d.*

131. Hourly Means of the Readings obtained from the Self-Recording Instruments at the Five Observatories under the Meteorological Council, 1894. 24*s.*

132. Monthly Current Charts for the Atlantic Ocean. From information collated and prepared in the Meteorological Office. Published by the Admiralty. 7*s.*

NON-OFFICIAL.

No. 1. Report of an Inquiry into the Connexion between Strong Winds and Barometrical Differences.—By Robert H. Scott, Director of the Office. 6*d.*

2. Report to the Committee of the Meteorological Office on the Meteorology of the North Atlantic.—By Captain H. Toynbee, F.R.A.S., Marine Superintendent. 1*s.*

3. Report to the Committee of the Meteorological Office on the Use of Isobaric Curves.—By Captain H. Toynbee, F.R.A.S., Marine Superintendent. 1*s.*

4. Routes for Steamers from Aden to the Straits of Sunda and back. Translated from a Paper issued by the Royal Meteorological Institute of the Netherlands. 6*d.*

5. On the Winds, &c. of the North Atlantic along the Tracks of Steamers from the Channel to New York. Translated from a Paper issued by the Deutsche Seewarte, Hamburg. 6*d.*

6. Report of the Proceedings of the Meteorological Conference at Leipzig. 1872. 1*s.*

7. Notes on the Form of Cyclones in the Southern Indian Ocean. — By C. Meldrum, M.A., F.R.S. [Out of Print.]

8. Report on Weather Telegraphy and Storm Warnings. Presented to the Meteorological Congress at Vienna. 1873. 6*d.*

9. Report of the Permanent Committee of the First International Meteorological Congress at Vienna for 1874. 1*s.* 6*d.*

10. On the Physical Geography of the part of the Atlantic which lies between 20° N. and 10° S. and extends from 10° to 40° W. A Paper read before the British Association at Bristol, in August 1875.—By Capt. Toynbee, F.R.A.S., F.R.G.S., Marine Superintendent. [Out of Print.]

No. 11. Report of the Permanent Committee of the First International Congress at Vienna for 1876. With Supplement. 2*s.*

12. Reports to the Permanent Committee of the First International Meteorological Congress at Vienna on Atmospheric Electricity, Maritime Meteorology, and Weather Telegraphy, 1878. 2*s.*

13. Report of the Permanent Committee of the First International Congress at Vienna for 1878. 6*d.*

14. Report of the International Meteorological Committee. Meeting at Berne, 1880. 1*s.*

15. Report of the Second Meeting of the International Meteorological Committee, held at Copenhagen, August 1882. 2*s.* 6*d.*

16. Report of the Third Meeting of the International Meteorological Committee, held at Paris, September 1885. 1*s.*

17. Report of the Fourth Meeting of the International Meteorological Committee, held at Zürich, September 1888. 4*d.*

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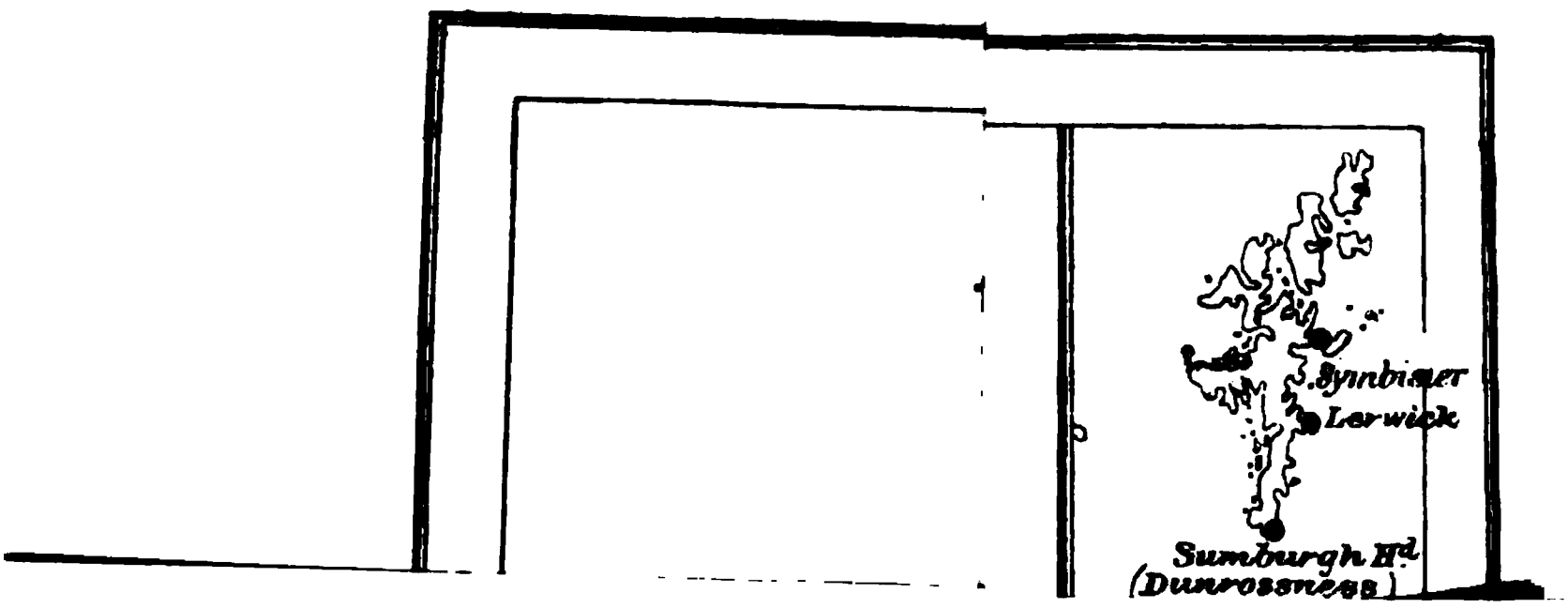

HARVARD COLLEGE

REPORT

OF THE

METEOROLOGICAL COUNCIL

For the Year ending 31st of March 1898,

TO THE

PRESIDENT AND COUNCIL

OF THE

ROYAL SOCIETY.

Presented to both Houses of Parliament by Command of Her Majesty.

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THE METEOROLOGICAL COUNCIL,

1897–98.

Lieutenant-General SIR RICHARD STRACHEY, R.E., G.C.S.I., LL.D., F.R.S., Chairman.

MR. ALEXANDER BUCHAN, M.A., LL.D., F.R.S.E., F.R.S.

Professor GEORGE HOWARD DARWIN, M.A., LL.D., D.Sc., F.R.S.

MR. FRANCIS GALTON, M.A., D.C.L., D.Sc., F.R.S.

MR. WILLIAM N. SHAW, M.A., F.R.S.

Rear-Admiral SIR WILLIAM J. L. WHARTON, K.C.B., F.R.S., Hydrographer of the Admiralty.

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LIBRARY.

Mineral Fund.

REPORT

OF THE

METEOROLOGICAL COUNCIL,

For the Year ending 31st of March 1898,

TO THE

PRESIDENT AND COUNCIL

OF THE

ROYAL SOCIETY.

Introductory

The Council has sustained a serious loss during the year in the death of Mr. Edward J. Stone, the Radcliffe Observer, which occurred on the 9th of May, 1897, after a short illness. Mr. Stone was appointed a member of the Council on the death of Professor H. J. S. Smith in 1883, and he was throughout a constant attendant at its meetings.

The Council desires to record its high sense of the value of Mr. Stone's services during the long period of his membership. As Radcliffe Observer at Oxford, he had charge of the self-recording meteorological instruments which have been maintained there since 1879. These had been supplied to him to replace the self-recording apparatus erected in 1854, by the late Mr. Manuel Johnson, which were in need of renewal.

The vacancy in the Council has been filled by the appointment of Mr. William Napier Shaw, F.R.S., Fellow of Emmanuel College, Cambridge. Mr. Shaw took his seat at the Council on the 27th of May, 1897.

The executive of the Office is the same as before, Mr. R. H. Scott, M.A., D.Sc., F.R.S., being the Secretary, and Nav.-Lieut. C. W. Baillie, R.N., F.R.A.S., the Marine Superintendent.

The work of the Office may be conveniently considered under four heads, namely:

I. Ocean Meteorology.

II. Weather Telegraphy.

III. Climatology.

IV. Miscellaneous Investigations, and Administration.

PART I.

Ocean Meteorology.

Collection of information.

Collection of Information.—The Office continues, as in the past, to collect data with respect to the meteorology of the ocean, and to carry out this object complete outfits of meteorological instruments are supplied to officers of merchant ships who are willing to make observations at sea.

ollection of
nformation.

The instruments supplied are:—

One barometer; six thermometers, with a screen; four hydrometers.

On the return of the ship to England the officer sends in a fair copy of the meteorological log and returns the instruments to the Office or to its agents.

Her Majesty's ships also are supplied with instruments, which, however, differ slightly from those lent to the Mercantile Marine. The Council continues to receive valuable observations from the officers of the Royal Navy.

gents.

In order to facilitate the supply of instruments to the Mercantile Marine, agencies are established at some of the principal ports.

The following is a list of these agents:—

Cardiff, T. L. Ainsley, Bute Docks.
Dundee, Capt. A. Wood, Navigation School.
Glasgow, Messrs. D. McGregor and Co., Clyde Place.
Greenock, Messrs. D. McGregor and Co., Brymner Street.
Hull, Messrs. Castle and Co., Commercial Road.
Liverpool, J. Gill, Nautical College.
Southampton, Capt. D. Forbes, High Street.

The number of merchant ships supplied with instruments and log books during the year has been 127.

Sets of instruments are kept in working order at the Office in London, and at each agency, for the purpose of instructing observers in the method of observation. Notices to captains as to the supply of instruments are frequently distributed both from the Office and from the several agencies.

Recognition
f "excellent"
bservers.

As a mark of recognition of valuable co-operation, the Council present various publications to observers who return well-kept logs. A list of the publications of the Office is given in Appendix XVI., p. 128.

Appendix I. (p. 31) contains a list of the observers who have, during the past year, contributed logs classed as "excellent." The Council takes this opportunity of expressing its best thanks to those who have thus assisted them. Several of these observers have co-operated with the Office for many years. The names which appear in the list for the first time are as follows:—

Observer's Name.	Ship.
Barber, J.	S.S. "Oanfa."
Constantine, T.	S.S. "Don."
Crewe, E.	S.S. "Victoria."
Davies, E. H.	S.S. "Heraclides."
Dawson, Lieut. and Commr. W. P., R.N.	H.M.S. "Waterwitch."
De la Garde, P., R.N. (Assistant Paymaster).	H.M.S. "Waterwitch."
Dickinson, L. R.	S.S. "Danube."
Gibson, J.	S.S. "Amber."
Greey, R., R.N.R.	S.S. "Amber."

Observer's Name.	Ship.
Hague, J. W.	S.S. "Pretoria" and S.S. "Spartan."
Jaggard, R.	S.S. "Waimate."
Johnston, J....	Barque "Blengfell."
Lowis, Lieut. A. W., R.N. ...	H.M.S. "Penguin."
MacDonald, J.	Barque "Marion Frazer.
Nares, Lieut. G. E., R.N.	H.M.S. "Penguin."
Pascoe, Lieut. F. C., R.N.	H.M.S. "Penguin."
Roberts, R.	S.S. "Cabenda."
Ross, J.	Barque "Alcides."
Shanklin, J. W.	S.S. "Ethiopia."
Title, F.	"Falls of Foyers."
Turner, A. C., R.N.R.	S.S. "Britannia."
Veale, E. A.	S.S. "Ormuz" and S.S. "Lusitania."
Ward, W.	S.S. "Argyle."
Watson, Sub-Lieut. H. C., R.N. ...	H.M.S. "Egeria."
Waugh, Lieut. A., R.N.	H.M.S. "Penguin."
Webster, T.	"Centesima."

Recognition of "excellen observers.

The Council note with regret the death of one of their observers, Capt. G. B. Armstrong, of the Royal Mail Steam Packet Company, who had kept ten logs, many of them being "excellent."

Character of logs receive

The meteorological logs received during the year numbered 146, of which 134 were either "excellent" or "very good."

The Council has continued to receive, through the Ocean Steamship Company of Liverpool, a considerable number of logs, principally relating to voyages to and from the China Seas, viâ Suez.

A list of the meteorological logs received at the Office from ships during the year is given in Appendix II. (p. 33). It may be summarised as follows:—

Districts from which observations are obtained

North Atlantic ...	.. 450	Pacific Ocean, South ...	95
South „ ...	... 136	Mediterranean	79
Indian Ocean ...	... 117	Red Sea	58
Pacific Ocean, North ...	48	Arctic Ocean	4

Publications

Various publications of the Office in connection with ocean meteorology have been either completed during the year, or are in progress.

Current Charts.

Current Charts for all Oceans.—This work is now completed, and is in the hands of the public.

In the case of the Pacific, a chart for every third month only has been engraved, as material was lacking to produce reliable monthly charts. These have been supplemented by generalized observations from the month on either side, and yet large areas are left for which no certain information can be given. As the information for this ocean continues to be received, it is proposed to plot it in such a manner that the generalized charts may be gradually improved.

outhern
Ocean.

The Meteorology of the Southern Ocean.—The region referred to lies between the Cape of Good Hope and New Zealand, south of latitude 30° S. As no charts for this area have been previously published, the work will probably be of much value.

The charts are now nearly all engraved. They consist of wind, current, and sea temperature charts, and as each series contains twelve monthly charts, there will be 36 in all.

The wind charts are partitioned into areas bounded by parallels of latitude 3° apart, and meridians of longitude 10° apart. The prevalent winds are indicated by the same form of wind-rose as that adopted in the Red Sea charts (see the Report for 1892, p. 7). Isobars of mean barometric pressure are drawn on the maps, to show the relationship between mean pressure and prevalent winds. The per-centage of observations, when fog was met with, is noted in the corner of each area. A small chart of the whole area is placed in the corner for the purpose of showing the mean air temperature by isotherms, and the occurrence of fog. This method was adopted because it was found that if the isotherms and fog lines were drawn on the large charts there was danger of confusion.

The sea temperature charts show, by shading, the areas over which the range of temperature exceeds 20°.

The current charts are copied from the charts of the Pacific and Indian Oceans.

outh
tlantic.

The Meteorology of the South Atlantic and of the West Coast of South America.—The logs in the Office, which relate to this region, have been analysed; the data for those regions which are rarely visited by merchant shipping are supplied chiefly from the logs of the Royal Navy.

The extraction of the data for several months of the year is now practically complete, and the whole collation of data from the above sources will be shortly brought to a close.

Observations from the Pacific Ocean.—As our knowledge of the meteorology of the Pacific Ocean is very imperfect, the Council have made arrangements with Mr. H. C. Russell, F.R.S., C.M.G., Director of the Sydney Observatory, which will, they hope, lead to the acquisition of further information. They have obtained permission from the Admiralty to supply instruments from the store at the Dockyard at Sydney to merchant ships which cross the Pacific.

nstruments
or distant
tations.

Collection of Meteorological Observations from Distant Stations.—It has been the custom of the Office to supply instruments to observers in unfrequented parts of the world, when it has reason to believe that the observations will be taken with due care. the observers undertaking to send in copies of their observations.

A list of the documents received during the year from such foreign land stations is given in Appendix XII. (p. 94).

The only new station of this class supplied with instruments on loan during the past year was Colon.

A set of meteorological instruments was lent to the Exhibition of the Shipmasters' Society, held at the Fishmongers' Hall in July, 1897.

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upplied for
he
dmiralty.

Climatological Information for the Admiralty.—Statistics as to the climates of foreign ports are from time to time required by the Admiralty for use in various publications; a good deal of research and

of correspondence with foreign meteorological Institutes has been required to supply the necessary information.

Stock of instruments belonging to the Office.

Supply and Stock of Instruments.—In Appendix III. (p. 42) a list is given of the meteorological instruments supplied during the year by the Office to the Royal Navy, together with a statement of the stock and of the distribution of the instruments standing on the books to the account of the Admiralty on the 31st March, 1898.

Appendix IV. (p. 43) gives similar information with regard to the disposal of the other instruments belonging to the Office, which either remain in store, or have been supplied to the Mercantile Marine, to Observatories, and to Telegraphic Stations, &c.

PART II.

Weather Telegraphy and Forecasts.

General.

The forecasts issued by the Office of the probable weather throughout the United Kingdom are based on meteorological observations made at a number of stations, which are in direct telegraphic communication with the Office.

The Telegraphic Reporting Stations are those marked with the letter "T" in the list given in Appendix XI. (p. 88), and the same Appendix contains at p. 93 a list of the Foreign Stations which send daily telegrams to the Office.

The staff of observers has remained unchanged during the year, except that at North Shields Mr. Clark has succeeded Mr. Irvine, who has left North Shields, after 28 years' service, during which he has furnished careful observations to the Office.

There has been no serious interruption of telegraphic communication during the year.

The Office receives an increasing number of inquiries concerning the weather, and a considerable amount of investigation and correspondence is required to obtain the needed information.

Inspection of the Stations.

Inspection of the Telegraphic Reporting Stations.—The stations in the United Kingdom have been inspected during the year, in England by Messrs. Gaster, R. Curtis, J. Curtis, and Brodie; those in Scotland by Mr. Buchan, and in Ireland and Wales by Mr. Scott.

The reports of the Inspectors are printed in Appendix V. (p. 44), and they show that efficiency has been maintained.

Discussion of the reports.

Discussion and Publication of the Information received.—A detailed account of the manner in which the meteorological information received by telegraph is utilised was given in Appendix X. of the Report for 1891, and there has been no change of procedure since that date. The Daily Weather Report contains a synopsis of the weather on the day of issue, based on the telegraphic data; this has appeared regularly during the year. Certain copies of the Daily Weather Report are distributed without charge, namely, 7 to newspapers, 71 for public exhibition at seaports, 80 to Government Offices and public institutions, 61 to correspondents of the Office, and 35 to foreign meteorological institutions. The issue to paying subscribers amounted to nearly 200 copies.

Distribution of reports.

Weekly Weather Report.

The Weekly Weather Report, and the various Appendices, contain Weekly and Monthly Summaries of the chief elements of the Weather. Details as to those publications are contained in Part III., pp. 17, 18, and in Appendix VI., p. 75.

Display of information in front of the Office.

Display at the Meteorological Office in London of Information as to the Weather on British Coasts.—At 9.30 a.m. and 3 p.m. every week day the substance of the reports received by telegraph, as to the state of the weather and of the sea at the following stations: Yarmouth, Dungeness, the Needles (Hurst Castle), Scilly, Holyhead, and Valencia Island, is conspicuously displayed on the balcony of the Office, at 63, Victoria Street, S.W. At the same hours charts are suspended in the portico of the street door, which exhibit the latest information from all our coasts, and the latest forecasts and storm warnings that have been issued. The Council have reason to believe that the public appreciates the opportunity thus afforded them of learning the state of the weather on the coasts.

Forecasts for the Admiralty.

Supply of Forecasts to the Admiralty.—At the request of the Admiralty daily forecasts are supplied regularly to the Commander-in-Chief, at Devonport.

Forecasts.

Weather Forecasts.—Forecasts are made three times a day, namely, at 11 a.m., at 3.30 p.m., and 8.30 p.m. The Forecasts, issued at 11 a.m., are based on the telegrams of observations made at 8 a.m., and refer to a period of 24 hours from noon on the day of issue. These Forecasts are exhibited at several places in London,* and are supplied to newspapers for their later editions. The Forecasts issued at 3.30 p.m. are of especial value in relation to storm warnings. They are also of service in the special series of Hay Harvest Forecasts referred to on p. 11. The forecasts at 8.30 p.m. are prepared for the next morning's newspapers. Each of the three forecasts has its special applicability, and all of them are available to the public on inquiry at the Office either by letter, by telegram, or in person.

Inquiries at the Office.

The inquiries received by telegram through the Post Office for special forecasts amounted during the year to 106, and the personal applications to 73. The rules of the Office relating to such inquiries are stated in Appendix VI., p. 77.

Results of Forecasts.

A comparison for the year of the Forecasts for the United Kingdom issued at 8.30 p.m., with the subsequent weather actually experienced, is given in detail in Appendix VII., p. 80.

The complete success, partial success, partial failure, and complete failure of the forecast is estimated according to definite rules which are designed to eliminate bias as far as possible.

It will here suffice to state that partial success means that the Forecast was correct at more than half the places of observation situated in the district in question, and a similar interpretation is to be applied to the term partial in the case of the failures.

---

* Namely, in the City at the Mansion House, Lloyd's Rooms, Messrs. R. & J. Beck's, Cornhill, and Messrs. de la Rue & Co.'s, Bunhill Row; in the West End. in the Libraries of the House of Lords and the House of Commons; at Messrs. Elliott's, St. Martin's Lane; Messrs. Stanford's, Charing Cross; Messrs. Negretti & Zambra's, Regent Street; and Messrs. Pastorelli's, New Bond Street; and at the Office, 63, Victoria Street.

The detailed comparison of the Forecasts with actuality may be summarised as follows:— Results of Forecasts.

SUMMARY of RESULTS of 8.30 p.m. FORECASTS, 1897–98.

Districts.	Per-centages.				
	Complete Success.	Partial Success.	Partial Failure.	Complete Failure.	Sum of Successes, Complete and Partial.
SCOTLAND, N. ...	50	21	13	6	81
„ E. ...	55	24	16	5	79
ENGLAND, N.E. ...	54	30	12	4	84
„ E.	57	27	12	4	84
MIDLAND COUNTIES...	58	27	11	4	85
ENGLAND, S.	60	27	10	3	87
SCOTLAND, W. ...	53	22	16	9	75
ENGLAND, N.W. ...	55	26	13	6	81
„ S.W. ...	58	26	10	6	84
IRELAND, N.	54	24	15	7	78
„ S.	52	25	15	8	77
Summary ...	55	26	13	6	81

In order to test the success of the Forecasts of the year in comparison with those of previous ones, the following table has been drawn up. It shows for each year of the decade 1888-97 the per-centages of complete and partial success of the Forecast issued at 8.30 p.m. It will be noticed that the highest degree of complete success was obtained in 1893.

PER-CENTAGES of SUCCESS in the FORECASTS for the whole of the BRITISH ISLES.

Year.	Complete Success.	Partial Success.	Sum of Successes, Complete and Partial.
1888	51	31	82
1889	49	32	81
1890	50	32	82
1891	50	30	80
1892	46	33	79
1893	59	25	84
1894	56	27	83
1895	55	25	80
1896	54	27	81
1897	55	26	81
Average	52·5	28·8	81·3

Hay Harvest Forecasts.—As in previous years the Council has during the hay harvest sent Daily Forecasts, without charge, to certain observers selected by the Royal Agricultural Society, the Royal Dublin Society, and the Highland and Agricultural Society. The Council makes it a condition for the supply of these forecasts, that the information shall be disseminated by the recipients as widely as possible, and that a record of the weather actually experienced shall be sent weekly to the Office. Hay Harvest Forecasts.

Hay Harvest Forecasts.

LIST of RECIPIENTS of the HAY HARVEST FORECASTS in 1897.

Districts.	Recipients.	Address.
0. SCOTLAND, N. ...	Rev. Dr. Joass ...	Golspie.
	Major Smith	Munlochy, Inverness.
1. SCOTLAND, E. ...	T. Wilson	Glamis Castle, by Forfar.
	C. Pirrie	Rothiemay, Huntly.
	T. Bett	Dalnaline, Aberfeldy.
2. ENGLAND, N.E. ...	Sir J. Wilson... ...	Chillingham Barns, Belford, Northumberland.
	J. Smith	The Ferneries, Ulceby.
3. ENGLAND, E. ...	W. Birkbeck	High House, Thorpe, Norwich
	Sir J. B. Lawes, Bt., and Sir J. H. Gilbert.	Rothamsted, Harpenden.
4. MIDLAND COUNTIES ...	Royal Agricultural College.	Cirencester.
	Major Fosbery ...	Warwick.
	T. H. Thursfield ...	The Grange, Much Wenlock.
	E. E. Harcourt-Vernon	Grove Hall, East Retford.
5. ENGLAND, S. ...	The South-Eastern Agricultural College.	Wye, near Ashford, Kent.
	C. Whitehead ...	Barming House, Maidstone.
	E. P. Squarey ...	The Moot, Downton, Wilts.
	M. J. Sutton	Kidmore Grange, Caversham.
6. SCOTLAND, W. ...	W. Calder	Castle Hill, Dalreoch, Dumbarton.
	Sir M. J. Stewart, Bt., M.P.	Ardwell, Stranraer.
	J. Loughton	Eallabus House, Islay.
7. ENGLAND, N.W.	Lord Egerton of Tatton	Tatton Park, Knutsford.
	R. Metcalfe, M.D. ...	Leyburn, Yorkshire.
8. ENGLAND, S.W. ...	The Earl of Ducie ...	Tortworth, Gloucestershire.
	T. Dyke	Long Ashton, Clifton, Bristol
	R. Neville Grenville	Butleigh Court, Glastonbury.
9. IRELAND, N. ...	E. F. Farrell	Moynalty, Co. Meath.
	J. M. Wilson	Currygrane, Edgeworthstown.
10. IRELAND, S. ...	D. A. Milward ...	Lavistown, Kilkenny.
	W. Talbot Crosbie ...	Ardfert Abbey, Tralee, Co. Kerry.

The telegrams were sent daily for the period of about five weeks, commencing in some districts on June 1st. In certain cases, by special request, they were continued for a longer period. There were besides four who subscribed for the Hay Harvest Forecasts. Hay Harvest Forecasts.

The information from which the degree of success of the Forecasts has been estimated was furnished by the recipients themselves. The following table, compiled from these estimates, contains a summary of the independent judgments of those to whom the telegrams were sent.

SUMMARY OF RESULTS.—HAY HARVEST FORECASTS, 1897.

Districts.	Names of Stations.	Per-centages.				Sum of Successes, Complete and Partial.
		Complete Success.	Partial Success.	Partial Failure.	Complete Failure.	
SCOTLAND, N. ..	Munlochy and Golspie	80	12	8	—	92
„ E. ..	Aberfeldy, Glamis, and Rothiemay..	68	25	7	—	93
ENGLAND, N.E. ..	Belford and Ulceby	67	26	7	—	93
„ E. ..	Rothamsted and Thorpe	78	15	5	2	93
MIDLAND COUNTIES	Cirencester, East Retford, Warwick, Much Wenlock.	69	20	9	2	89
ENGLAND, S. ..	Maidstone, Downton, Caversham, and Wye.	78	20	2	—	98
SCOTLAND, W. ..	Ardwell, Islay, and Dumbarton ..	68	22	7	5	90
ENGLAND, N.W. ..	Leyburn and Knutsford	63	22	13	1	85
„ S.W. ..	Tortworth, Clifton, and Glastonbury	62	24	11	2	86
IRELAND, N. ..	Moynalty and Edgeworthstown ..	59	24	11	6	83
„ S... ..	Tralee and Kilkenny	62	28	8	2	90
	Mean for all districts	68	22	8	2	90

These figures show that 90 per cent. of the Forecasts were useful; the corresponding per-centage in 1896 was 88. Several of the recipients expressed in writing their satisfaction with the accuracy of the Forecasts.

Storm Warnings for the Coasts of the United Kingdom.— Warnings of coming storms are despatched by telegraph to certain stations on the coast. These stations are supplied with signals which are hoisted as warnings to mariners of expected storms. The signals are defined in Circular 717 of the Board of Trade, issued in February, 1874. Storm Warnings.

A list of the stations is given in Appendix VIII., p. 81. At the end of March, 1898, there were 215, of which 117 were in England and Wales, 63 in Scotland, 28 in Ireland, 4 in the Isle of Man, and 3 in the Channel Islands.

A comparison has been made in the Office between the warnings issued during the year and the subsequent weather actually experi-

Storm Warnings.

enced. The method of comparison is explained in Appendix VI., p. 75, and the results are exhibited in the following table:—

COMPARISON between the WARNINGS and the subsequent WEATHER in 1897.

Coasts.	Total No. of Warnings.	Warnings justified by subsequent Gales. Force 8 and upwards.	Warnings justified by subsequent strong Winds. Forces 6 & 7.	Warnings not justified by subsequent Weather.	Warnings late. Force 8 reached at two Stations before issue.	Warnings partially late. Force 8 reached at one Station before issue.	Storms for which no Warning was issued.
Scotland, N.E.	57	36	13	4	1	3	March 28, May 8–9, May 11, Sept. 4.
„ E.	44	20	18	6	—	—	Jan. 22.
„ N.W.	54	33	17	2	—	2	—
„ W.	55	29	22	4	—	—	—
Ireland, S.W.	52	31	15	4	—	2	—
„ N.W.	55	30	18	3	1	3	June 16, Dec. 6.
Irish Sea	52	34	10	2	1	5	May 11 June 16 Sept. 4.
St. George's Channel ...	43	24	17	1	—	1	—
Bristol Channel	42	33	9	—	—	—	—
England, S.W.	39	31	8	—	—	—	—
„ S.	25	12	13	—	—	—	Nov. 29.
„ S.E.	24	12	11	1	—	—	Sept. 5, Nov. 29.
„ E.	22	15	6	—	—	1	Nov. 29.
„ N.E.	32	18	12	—	—	2	—
Totals	596	358	189	27	3	19	
Percentages... ...		60·1	31·7	4·5	0·5	3·2	

NOTES as to GALES EXPERIENCED in 1897, but for which no WARNING was issued.

January 22nd., Scotland East.—At 6 p.m. on January 21st a depression of moderate depth lay over Denmark, and light to moderate Northerly and North-westerly winds prevailed over our Islands. Forecast was for "very strong" and "squally" winds, but the barometer rose so quickly in the north of Scandinavia that a North-easterly gale resulted on this coast.

March 28th., Scotland North-east.—At 8 a.m. on 28th (Sunday) there were two depressions—one over the Shetlands, the other over the North Sea—neither of them very deep. At 6 p.m. (there are no 2 p.m. observations on Sundays) it was already too late to warn this district, but our north-west and west coasts were warned successfully. The gale was due to a rapid increase of pressure over the Atlantic, in the rear of the depression.

May 8th-9th., Scotland North-east.—There was a depression over the Shetlands at 8 a.m., 8th, which moved to Norway by 6 p.m. In its rear the barometer rose with unexpected rapidity, and a gale ensued.

Storm Warnings.

May 11th., Scotland North-east and Irish Sea.—At 8 a.m. on May 10th there was an apparently unimportant depression over Scandinavia. This moved southwards, and its secondaries swept down our north-east coasts, causing gales in many places. The north-east and east coasts of England were duly warned.

June 16th.—Ireland North-west and Irish Sea.—On June 15th the appearance was very quiet till evening, the barometer then fell fast in the extreme north-west, but at 6 p.m. it had not fallen below 29·75 inches, even at Belmullet. The depression subsequently passed eastwards across the north of Ireland and the south of Scotland; and gales from the North-west were experienced.

September 4th.—Scotland North-east and Irish Sea. At 8 a.m. on September 3rd a depression lay over Scandinavia and was passing off; at 6 p.m. a new secondary system was approaching Scotland from the westward, and the wind had fallen light. The general appearance did not justify the issue of warnings, but a North-westerly gale, although not a severe one, followed in the south-east of England on 5th. Strong winds had been predicted, but not gales.

November 29th., England South, South-east and East.—All our other coasts had been warned, but at 6 p.m. on Sunday, 28th, it was too late to warn these coasts, as a gale from the North-west and North had already set in.

December 6th.—Ireland North-west. At 8 a.m., 6th., there was a depression of no great depth off our north-west coasts moving north-eastwards, with nothing to indicate a gale. Later on the disturbance grew deeper and gales from South-west and West set in.

Almost all of these gales were caused by the sudden and unexpected increase of pressure in the rear of disturbances, of which the front did not present threatening appearances. This fact points to the existence of an area of unusually high pressure over the Atlantic during this year, which, though occasionally indistinct, rapidly re-appeared and caused the North-westerly gales enumerated above.

It is obvious that telegraphic information cannot be received from the Atlantic, and thus the means of forecasting disturbances of this kind are necessarily wanting.

Comparison of results for 1897 with previous years.

The following table contains a statement of the amount of success of storm warnings in the decade 1888-97. It will be seen that the warnings were very successful, although slightly less so than in 1894.

Years.	Total No. of Warnings issued.	Warnings justified by subsequent Gales.	Warnings justified by subsequent strong Winds.	Total Warnings justified.	Warnings not justified by subsequent Weather.
		p.c.	p.c.	p.c.	p.c.
1888	539	55·3	28·6	83·9	14·3
1889	373	47·7	33·5	81·2	16·9
1890	525	61·0	25·5	86·5	9·3.
1891	522	62·3	24·5	86·8	7·5
1892	488	59·4	31·2	90·6	6·8
1893	480	60·8	28·6	89·4	7·1
1894	502	68·5	23·5	92·0	6·0
1895	523	63·3	26·4	89·7	8·0
1896	467	67·7	23·8	91·5	2·9
1897	596	60·1	31·7	91·8	4·5

Fishery Barometers.

Fishery Barometers.—Barometers have for many years been lent by the Office to fishing villages and other places on the coast, for the benefit of sailors and fishermen. A list of the stations thus provided is given in Appendix IX., p. 83. There are 215 stations of this kind, of which 67 are in England, 7 in Wales, 61 in Ireland, 75 in Scotland, 4 in the Isle of Man, and 1 in Jersey.

PART III.

Climatology.

I.—British Isles.

Climatology.

Meteorological observations of the highest refinement and completeness entail considerable expense, and the service of highly trained observers. It has, therefore, been the policy of the Office to subsidise and to maintain an intimate relationship with a small number of observatories of the highest class. The data derived from these stations are suited for such investigations as require minute and continuous knowledge of the several meteorological elements. These stations are, however, too few and too widely scattered to afford a good general representation of the conditions of climate, the winds, barometric pressure, temperature, and sunshine, and it has accordingly been found necessary to supplement them by certain other "anemographic," "barographic," and "sunshine" stations.

The distribution of stations required for representing the climate of these islands likewise differs from that needed for the forecasting of the weather. For the latter purpose the Office relies only on the "Telegraphic Reporting Stations" referred to in Part II.

The climate of different parts of Great Britain and Ireland is very diverse, and fortunately there are throughout the country many stations where good meteorological observations are made by volunteer observers. Such of these stations as furnish the Office with observations are classed as stations of the second and third order respectively according to the amount of information furnished by each. Thus the Observatory at Bidston, Liverpool, and the Radcliffe Observatory at Oxford are ranked as of the second order, although their equipment and the quality of their work are of the first order.

A list of all the stations is given in Appendix XI. (p. 88). Certain letters are attached to each station, which indicate the nature of the information supplied to the Office. From what has been just stated it will have appeared that the stations may be classified in seven categories; but an examination of the list in Appendix XI. will show that the categories to a certain extent over-lap, so that the same station may occur in two of them.

The seven categories are as follows:—

Observatories of first order

1. *Observatories of the First Order*, maintained or subsidised by the Office, and furnishing continuous photographic records of the barometrical pressure and the temperature, and continuous records of rainfall, wind, and sunshine with frequent eye observations of the weather, and of the kind and amount of cloud.

2. *Anemographic Stations* which furnish continuous records of the direction and force of the wind. These records are often of use in affording evidence in courts of law; they are regularly employed in checking the accuracy of the storm warnings. Anemographic Stations.

3. *Barographic Stations* which furnish continuous records from the aneroid barometer. Barographic Stations.

4. *Sunshine Stations* which furnish continuous records of bright sunshine. At most of these the record is made by the Campbell-Stokes instrument, of which an account was given in the Annual Report of the Office for 1879 (p. 32.) Sunshine Stations.

The stations of the categories 2, 3, and 4 are of especial service in matters which relate to the weather, as distinguished from climate.

5. *Telegraphic Reporting Stations* which furnish the data for the forecasts and storm warnings, as explained in Part II. Telegraphic Reporting Stations.

6. *Stations of the Second Order* which furnish complete climatological data. The observations are taken twice a day, and the observers are volunteers and unpaid. Second Order Stations.

7. *Stations of the Third Order* which resemble those of the second order, except that the information sent to the Office is less full. Third Order Stations.

An account of the methods employed by the Office in dealing with all these records is given in Appendix X., p. 84.

The stations may be summarised as follows:—

Class.	Description.	Number.
1	Observatories	7
2	Anemographic stations	15
3	Barographic (Aneroid) stations	15
4	Sunshine stations	65
5	Telegraphic stations	30
6	Second Order stations	83
7	Third Order stations	66

Inspection of the Stations.—The stations classified under the heads 1 to 5 are visited regularly by the Inspectors of the Office. The stations of Class 7 are inspected as opportunity offers. Some of the stations of Class 6 belong to the Royal Meteorological Society, and are visited by an Inspector appointed by that Society. In accordance with the recommendation of the Treasury Committee (1877) a contribution towards the cost of this inspection is made by the Office. The rest of the stations of Class 6 are visited, in most cases annually, by the Inspectors of the Office. The inspection of the seven principal observatories and of some of the anemographic stations was carried out by Messrs. T. W. Baker and E. G. Constable, of the Kew Observatory. Inspection of Stations.

Extracts from the reports of the Inspectors are given in Appendix V., p. 44.

Information supplied to the General Register Office, Dublin.—Reports from the Irish stations have been supplied regularly to the Registrar General for Ireland, for his Weekly and Quarterly Returns. Reports supplied to Registrar-General for Ireland.

Details as to the Weekly Weather Report, which is prepared in the Telegraphic Branch of the Office, are given in Appendix VI. It supplies, by its synchronous daily charts and Monthly Summaries, an Publications. Weekly.

Publications. Weekly.

instructive view of the meteorological changes, day by day, over the greater part of Europe.

Appendix I. of the Weekly Weather Report for 1897 gives a summary for each quarter, and for the whole year, of the Rainfall and Temperature in each district, for the 32 years, 1866-1897, and also the Monthly and Progressive values of "Accumulated Heat," Rainfall, and Bright Sunshine for all the districts in each month of 1897,

Appendix II. to the same Report, gives, in continuation of the similar Appendices for 1896, the Weekly and Progressive values of the same elements during the year 1897.

Hourly Means of Meteorological Observations.

Hourly Means of Meteorological Observations.—Commencing with the year 1887, the Office has prepared and published for each year mean values obtained from the hourly readings yielded by the continuously self-recording instruments at their five first-class observatories. These means are for pressure, temperature and the hygrometric condition of the air, the force and direction of the wind, and the amounts of rainfall and sunshine. They are obtained for each hour of the day for periods of five days, for the calendar months, and for the year, and they supply a complete synopsis of the march of the different elements at the several observatories.

Recently, however, it was represented to the Council, by the Meteorological Conference which met at Paris in the autumn of 1896, that for certain investigations these mean values are insufficient, and that for some of the elements at least, and for a few observatories, it is desirable to publish the original hourly readings as derived from the records of the self-registering instruments; the Council have therefore arranged that, commencing with the year 1895, they will add to the volume of *Hourly Means* the hourly readings of pressure, temperature, and rainfall for the observatories of Valencia and Kew, as typical of the conditions prevailing respectively at a coast and at an inland station of the British Isles.

The volume of *Hourly Means* for 1894 was published during the year. A portion of the volume for 1895 is now in the press; its publication will, however, be somewhat delayed, because it is to include in it the mean values for the lustrum terminating with 1895.

The computation of the harmonic components of the diurnal variations of pressure and temperature, referred to in the last Annual Report, was commenced during the year, and has been completed for the period 1883-1892. It may be well to remark that the components for the years 1869-1882 have been already obtained.

Publication of Climatological Observations.

Observations at Stations of the Second Order.—The volume for 1894 is now issued, and that for 1895 is far advanced.

The form of this publication remains unchanged. It comprises, first, the actual observations at 9 a.m. and 9 p.m. at 21 stations, printed on a modification of the form, A., adopted for International use by the Meteorological Congress at Rome, 1879—and, secondly, the Monthly Means and Summaries at stations printed in the form B. also adopted by the same Congress, together with an Annual Summary for all stations, and a Return of Bright Sunshine.

As stated in last Report, the volume for 1894 differs from that for 1893, in that Carmarthen disappears from the form A. list, and is replaced by St. David's. Carmarthen also disappears from the form B. list, while Ben Nevis, Heysham Hall (Morecambe Bay), and Bramley, Surrey, are added to it.

The only change in the volume for 1895, as compared with that for 1894, is that Edgeworthstown is replaced by Tavistock, where Mr E. E. Glyde, F. R. Met. Soc., formerly of Babbacombe, Devon, has now resumed observations.

II.—Foreign and Colonial Stations.

Foreign and Colonial Stations.

Observations made at various Foreign and Colonial Stations are frequently received at the Meteorological Office.

During the year 40 such returns have come in, and a list of them is contained in Appendix XII., p. 94.

In most cases the observations were taken twice a day, and the results are dealt with in the same way as those from Stations of the Second Order, in Class 6 above. Continuous records of bright sunshine were received from Georgetown (Demerara) and from Trinidad.

The meteorological results given in the Cyprus Blue-Book, refer to six stations in the island. The tables continue to be compiled in the Office.

Returns from foreign and colonial stations have been published from time to time, but the Council has now determined upon a systematic publication of them. It is hoped that the first of these volumes will appear in the course of the year 1898-9. It will contain the available data up to, and inclusive of, 1895.

PART IV.

Miscellaneous Investigations and Administration.

Anemometer Experiments.

Anemometer Experiments.—A pressure plate anemometer has been set up at Holyhead, alongside of the pressure tube anemometer, and observations have been made with the new instrument since the beginning of September. An account of the apparatus and of the results of the observations, as far as they have gone, will be found in Note A.

The records derived from a pressure tube anemometer and from a bridled anemometer have been found to be so closely similar that the Council saw reason to doubt the necessity of maintaining both of these at the station. The former instrument is simple and gives a continuous record; it thus has some advantage over the bridled anemometer. But before taking any steps in the matter it appeared to them advisable to consult Sir G. G. Stokes, at whose suggestion the bridled anemometer was originally constructed. With his approval it has been determined to dismount the bridled anemometer at Holyhead.

To ensure the greater safety of these anemometers, a wall has been erected, by permission of the Board of Trade, round the small building with which they are connected.

Rainfall Means.

Rainfall Means for the British Islands.—This work has now appeared.

Atmospheric Electricity.

Atmospheric Electricity.—The subject of atmospheric electricity has again been brought under consideration, with a view to utilize the records that have been made at Kew for many years past. An application has been made to the Royal Society for a grant in support of a special research regarding the causes of variations of potential. It is hoped that one of the results of this investigation may be uniformity

in the records and improvement in the methods of observing atmospheric electricity.

The Library, &c.

Library.

The library contains standard works and serial publications on Meteorology and the allied sciences. It consists at present of about 14,500 volumes and pamphlets, there are besides many charts and MS. records of observations. The library at the Office is accessible to students engaged in meteorological investigations.

The catalogue is arranged both under authors' names and subjects, and each work is now entered on a card as soon as received.

Appendix XIII., p. 96, contains a list of the additions to the library during the year.

Appendix XV., p. 123, gives a list of the important contributions to meteorology which have appeared in the various reports issued by the Office since 1866.

Appendix XVI., p. 128, gives a catalogue of publications issuing from the Office.

Expenditure.

Financial.

Appendix XIV., p. 122, shows the receipts and payments during the year ending 31st March, 1898. The amount voted by Parliament was 15,300*l.*, as in the previous year, and the miscellaneous receipts amounted to £938 13*s.* 8*d.*

The following abstract of expenditure shows the true charge against the Parliamentary grant of this and the preceding year, together with the increase or decrease in 1897-98, as compared with the previous year:—

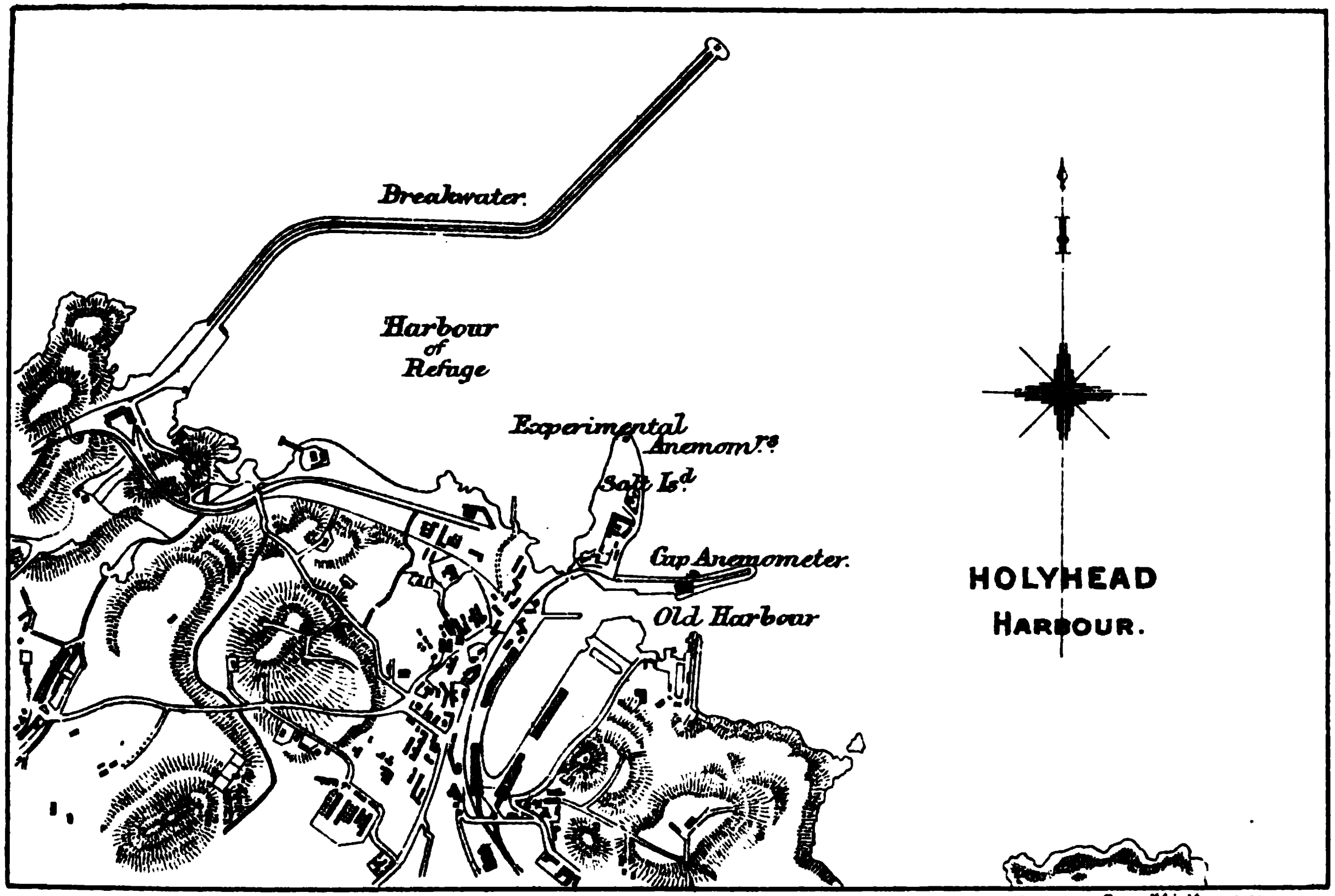
Net Expenditure.	1896–97.	1897–98.	Increase.	Decrease.
General Administration:	£ *s.* *d.*	£ *s.* *d.*	£ *s.* *d.*	£ *s.* *d.*
Payment of Council ...	991 5 0	968 9 5	—	22 15 7
Secretary	800 0 0	800 0 0	—	—
Office	945 8 0	990 1 3	44 13 3	—
Rent, Fuel, and Lighting	714 12 11	721 13 7	7 0 8	—
Alterations to premises and contingencies ...	273 15 8	313 11 8	39 16 0	—
Expenses incidental to International Meteorological Congress ...	23 10 8	—	—	23 10 8
Pensions	144 0 0	144 0 0	—	—
Special Researches ...	752 3 5	782 17 3	30 13 10	—
Land Meteorology ...	3,572 7 6	3,596 4 5	23 16 11	—
Weather Information ...	3,775 9 1	3,913 8 7	137 19 6	—
Inspections	445 17 0	403 5 11	—	42 11 1
Ocean Meteorology ...	2,396 17 11	2,350 12 1	—	46 5 10
Total ... ... £	14,835 7 2	14,984 4 2	284 0 2	135 3 2

In the year 1897-98 the sum of £1,613 10*s.* 6*d.* was paid to the Post Office on account of inland and foreign telegrams, allowances to telegraph clerks, rental of private wires, &c.

(Signed) R. Strachey,
Chairman.

June, 1898.

Fig. I.



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NOTE A.

Report upon Anemometer Experiments at Holyhead.

By Mr. R. H. Curtis.

The Council have, for some time past, had in operation at Holyhead four separate anemometers for recording the force or velocity of the wind, each acting upon a different principle, the object being to obtain the necessary data for instituting a comparison between their records.

Three of these instruments, namely, a pressure-tube anemometer, a "bridled" anemometer, and a pressure-plate anemometer, are erected at the extreme northern end of Salt Island, which is an open space, fairly level, about fifteen feet above the sea, and about a hundred and thirty yards wide, and projects about five hundred yards into the sea, on the eastern side of the Harbour of Refuge. Except for a few small houses at its southern end there are no buildings upon the island, and it therefore offers an excellent position for securing what is a condition of primary importance in carrying out any anemometrical investigation, namely, a perfectly free and uninterrupted exposure to the wind of the instruments to be experimented with.

The fourth anemometer is a Robinson cup instrument of the "standard" type, *i.e.*, with cups nine inches in diameter, carried upon arms two feet long, and this has not been removed from the position it has occupied for many years, above the disused lantern of the lighthouse on the pier at the entrance to the Old Harbour; in this position it is distant from the other anemometers on Salt Island a little more than 600 yards in a south-south-east direction. The positions of the anemometers relative to each other, and also to the town of Holyhead, will be seen from the subjoined sketch-plan (Fig. I) of the harbour and its neighbourhood.

Comparison of the Pressure-Tube and Robinson Cup Anemometers.

In the Report of the Office for the year 1896 an account was given of a comparison which had then recently been carried out between the records of the cup anemometer and the corresponding records of the pressure-tube anemometer on Salt Island, the result of which was to show: first, that upon the average wind velocities recorded by the cup anemometer were about 27 per cent. higher than the records of the same winds as obtained from the pressure-tube, thus pointing to the necessity for a modification of the factor employed for converting the movement of the cups into equivalent wind-velocities; and, secondly, that in addition to this, the indications of the cup instrument were further greatly influenced by the railway sheds, grouped around the base of the lighthouse, on the top of which this particular anemometer is placed. A plan of the pier and sheds had been given in the Report for 1895, and, briefly stated, it was now shown that when the direction of the wind was such as to cause it to blow *through* the sheds, from end to end, the result was to suck down air from the anemometer, whose record was

in consequence decreased and brought below tha of the pressure-tube; whilst when the wind blew *against* the closed sides of the sheds it was deflected upwards, over their roofs, causing more than the normal amount of air to pass over the cups, with the result that their record became correspondingly increased beyond that of the pressure-tube; it was only when the direction of the wind was such that the current of air neither blew directly through, nor against, the sides of the sheds, but in such a way as to slip past them, that the records of the two anemometers agreed.

This result was of considerable practical importance, as it proved the absolute necessity for securing a perfectly free and uninfluenced exposure for anemometers, in order to obtain from them a true record of the strength of the wind, and at the same time showed that causes hitherto quite unsuspected were capable of affecting their records in a very marked degree.

The consistent character of the results obtained left very little doubt as to their accuracy, although the number of observations available for the comparison was not so large as could have been wished, owing to the pressure-tube anemometer having been at work for a few months only. Now, however, there is a fairly large mass of data available for further testing the conclusions arrived at in 1896, and therefore it has been thought desirable to repeat the comparison with observations made subsequent to the publication of the previous report. Of course the question of the proper factor for the cup anemometer is to some extent involved in the investigation, and the wind velocities by that instrument have all been dealt with upon the assumption that its true factor is not 3·0 but 2·2; but it has not been thought necessary to re-open the question further as regards this particular instrument, because if the conclusions already arrived at respecting the effect of the sheds upon it are confirmed, it follows that its exposure at Holyhead is not sufficiently good to admit of its giving a satisfactory answer upon the point.*

In the present instance one hundred observations of moderate or fresh winds were taken under each of the 16 points of the compass,† and the mean velocity as given by the two instruments, was determined for each point. The results are given in the following Table I., and are also shown graphically in Fig. II.

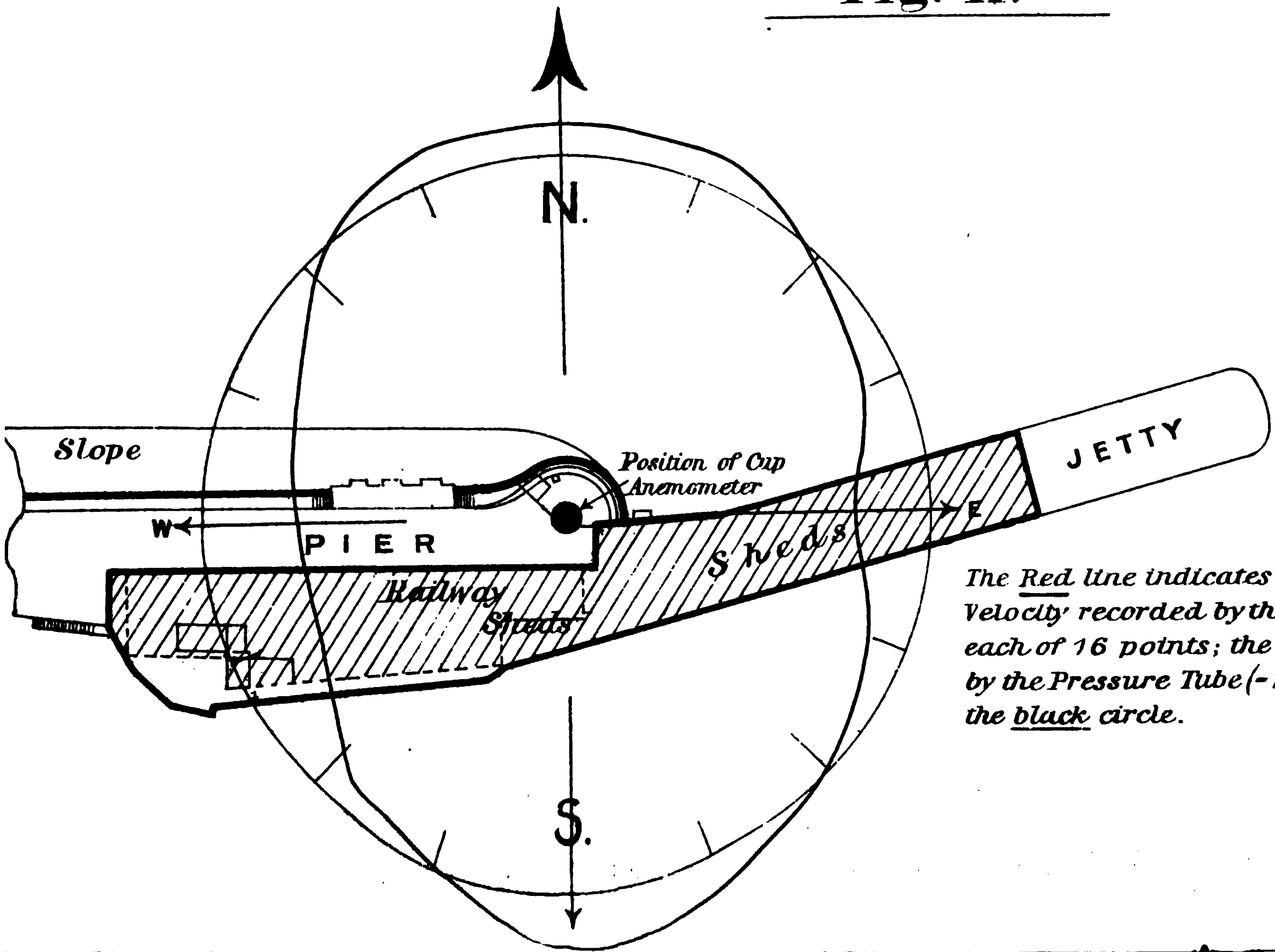
The results now obtained fully confirm those got by the previous comparison, the only differences worthy of note being:—

---

* Various attempts have been made to obtain the factor of the Robinson cup anemometer by comparing its records with those of a pressure-tube anemometer placed by its side, and run under exactly similar conditions. Such a comparison, extending over three years, has been carried out at Rousdon Observatory, in South Devon; and another, covering a period of eight months, at the Colába Observatory, Bombay. In both these instances the cup anemometer was similar to the one in use at Holyhead. The Rousdon comparison gave as the mean factor (2·2), and the Colába comparison (2·1). The Rousdon observations covered a much larger range of wind-force than did those at Bombay, and it is probable that the relation between the speed of the cups and that of the wind is affected both by the force of the wind, and by its steadiness or otherwise; and also by the conditions attaching to each instrument *in situ* so far as they affect the question of friction and the amount of work required to be done by the cups in registration.

† So many as 100 observations could not be obtained with winds from E.S.E. and S.E.

Fig. II.



The Red line indicates the percentage of Wind Velocity recorded by the Cup Anemometer for each of 16 points; the corresponding velocity by the Pressure Tube (-100) being shown by the black circle.

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(1) That the maximum *plus* difference is shown under South, instead of South-south-east, and that it amounts to only 15 per cent. instead of 22 per cent.; and

(2) That the *minus* difference under East is increased to 20 per cent. instead of 13 per cent. Generally, the differences, if put in the form of a curve, are seen to be more symmetrical than before, and those for opposite points, as North and South, and East and West, which are due to a similar kind of action, now approximate more closely to each other as regards amount; these changes are doubtless due to the smoothing effect of the larger number of observations it has been possible to use on the present occasion.

Table I.

Mean Difference between the Robinson and the Pressure Tube Anemometers shown by (about) One hundred Observations of Winds, with Velocity between 11 and 25 miles per hour, from each of Sixteen Points.

Direction of Wind.	Number of Observations.	Mean Velocity by		Difference in Miles R — P. T.	Percentage of Difference to Mean by P.-Tube.
		Robinson (Factor 2·2).	Pressure-Tube.		
		Miles.	Miles.	Miles.	%
North.	100	19·7	18·0	+ 1·7	+ 9·4
N.N.E.	100	20·7	18·9	+ 1·8	+ 9·5
N.E.	100	17·0	17·1	— 0·1	— 0·6
E.N.E.	100	16·3	18·2	— 1·9	— 10·4
East.	100	12·9	16·0	— 3·1	— 10·4
E.S.E.	*65	14·1	15·7	— 1·6	— 10·2
S.E.	*56	14·4	14·4	0·0	0·0
S.S.E.	100	17·5	16·2	+ 1·3	+ 8·0
South.	100	19·4	16 9	+ 2·5	+ 14·8
S.S.W.	100	17·1	17·2	— 0·1	— 0·6
S.W.	100	15·6	17·5	— 1·9	— 10·9
W.S.W.	100	13·9	18·7	— 4·8	— 25·7
West.	100	13·7	18·5	— 4·8	— 25·9
W.N.W.	100	14·8	18·5	— 3·7	— 20·0
N.W.	100	17·8	18·4	— 0·6	— 3·3
N.N.W.	100	19·9	18·2	+ 1·7	+ 9·3

* In these cases so many as one hundred observations were not available.

The figures in this table demonstrate very clearly the necessity there is for having a perfectly free exposure for anemometers, in order to get from them the true velocity of the wind. With instruments which require a mechanical connection between the recording apparatus and the parts acted upon by the wind, this is frequently a difficult condition to secure, and the question is opened up as to how far, and in what way, existing anemometrical records derived from instruments placed on buildings, as all large-sized cup-anemometers are, have been affected by the obstruction offered by those buildings to the free passage of the wind. The conditions at Holyhead are no doubt exceptional, and their effect, as shown by the diagram, is of course peculiar to that place; but it is to be feared

that in other instances also the buildings, or other objects, in the close neighbourhood of the anemometers, are such as to affect their records prejudicially.

Comparison of the Pressure-Tube and the "Bridled" Anemometers.

These two instruments have now been at work side by side for nearly three years, and although during that time they have not experienced any gale of exceptional violence, yet they have afforded a good deal of material for making a comparison between their records.

A description of the bridled anemometer will be found on p. 28, and therefore it will suffice to say here that it measures the force of the wind through the resistance offered, by some weights, to the turning of a set of five cups, arranged spirally upon a vertical spindle, and exposed to the wind. The pressure-tube anemometer, on the other hand, achieves the same end by the displacement of a specially-shaped float, contained in a closed vessel of water, but communicating with the air by means of a tube, leading to a vane which is kept constantly facing the wind.*

The bridled anemometer was not designed to register light winds, and therefore it is unaffected by any wind of lower velocity than 20 miles per hour, and the inertia of the instrument is not entirely overcome until the velocity has risen to fully 30 miles per hour; but with stronger winds than this its indications are found to agree very closely with those of the pressure-tube. It sometimes happens, in sudden and transient squalls, that the gust begins to abate before the float of the pressure-tube has had time to fill and rise to its proper height, in which case that instrument fails to record the maximum force which is shown by the bridled anemometer, whose cups respond at once to the wind, and indeed may occasionally, as a result of their inertia, be carried somewhat beyond the proper point. Such differences, however, seldom exceed a rate of two or three miles per hour, and only occur with very transient gusts of wind; if the gust lasts for but a few seconds, or if it is at once followed by another of equal force, as not infrequently happens, then the float has time to fill, and the two records agree.

It may therefore be said that, as regards the range of wind-force which has been covered by the observations made in this comparison, the indications of the two instruments are practically identical.

The value of the comparison lies very much in the mutual support which the records of the two instruments—each obtained in a different way, although by the application of a similar principle,—afford to each other, and in the confidence in their accuracy which their agreement supplies.

Comparison of the Pressure-Tube and the new Pressure-Plate Anemometers.

The most recently erected anemometer at Holyhead is a pressure-plate, the recording portion of which has been arranged upon a somewhat novel plan.

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* For fuller descriptions of both these instruments *see* Report of the Council for the year ending March 31, 1893. and Note B. p. 21, in this Report.

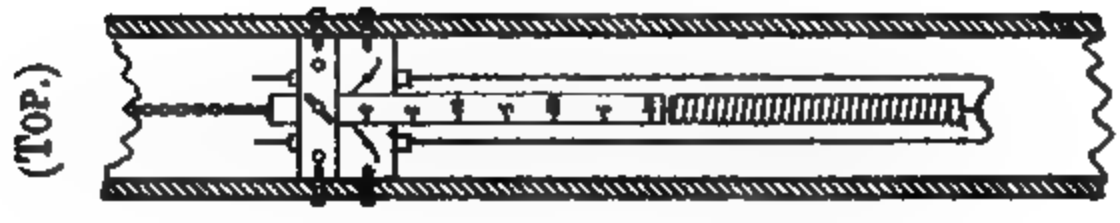
The plate itself is a thin circular disc of aluminium, of one square foot area, and is supported, at the height of 26 feet above the ground, upon an iron column, which stands only a few feet away from the pressure-tube and the bridled instruments. The plate turns freely in azimuth, and is kept facing the wind by a fin-shaped vane, which is placed about two feet in the rear of the plate and rises a little above its top edge; by this arrangement not only is the vane not sheltered by the plate, but any interference with the free movement of the air flowing around the edges of the plate is avoided.

The apparatus is designed to register only the *maximum* pressure exerted by the wind upon the plate since the last observation, and after every reading of the scale the index requires to be reset. Readings are therefore made only at definite times, usually once a day, except in stormy weather, when they would be made as frequently as possible; but owing to the remote position of the instrument the number of observations is necessarily restricted.

The action of the instrument will be best understood by the aid of the accompanying diagrams, figures III *and* IV. Figure III. shows

Fig. III.

Fig. IV.



a section of the plate (P.), to the back of which is fastened a tube (T.), which, by means of friction rollers, slides easily to and fro in the slightly larger tube C. To this sliding tube a chain is attached, and as the plate and tube are together driven back by the wind this chain pulls upon the spring shown in figure IV., p. 25, which is securely fastened inside the column at a point where it can be easily seen by the observer. The extension of the spring which is thus effected is shown by a brass bar graduated to indicate pounds, and having on each edge a ratchet and pawl, so arranged that after the spring has been extended it cannot go back again, but must remain extended until the pawl is released by the observer. By this arrangement the maximum pressure is reached gradually, pound by pound, and any error in the record due to the momentum of the plate, acting under the influence of sudden sharp gusts, is avoided.

In pressure-plates which are free to oscillate to and fro with each gust of wind, as is usually the case, the chance of error from the momentum of the plate is very great, and there is little doubt that from this cause such plates in gusty winds often travel a considerable distance in excess of the proper amount, giving rise to records of wind-pressures which are not really experienced.

Owing to a fault which became developed in the bearing of the vane, soon after its erection, the instrument had to be dismounted again, and it was not until the end of January 1898 that it came regularly into work. The number of observations at present available is therefore not very large, and as the strongest winds of the year were experienced whilst the instrument was out of action the number does not include any very high pressures; but the results of the comparison, so far as it has gone, are very interesting.

The method adopted has been to compare with each reading of the pressure-*plate* the maximum pressure indicated by the pressure-*tube* during the interval covered by the reading. These observations were then grouped according to the pressure-plate readings, and the mean equivalent by the tube found for each pound of pressure recorded by the plate; these equivalent pressures, together with the number of observations from which they were determined, are shown in the following table II.

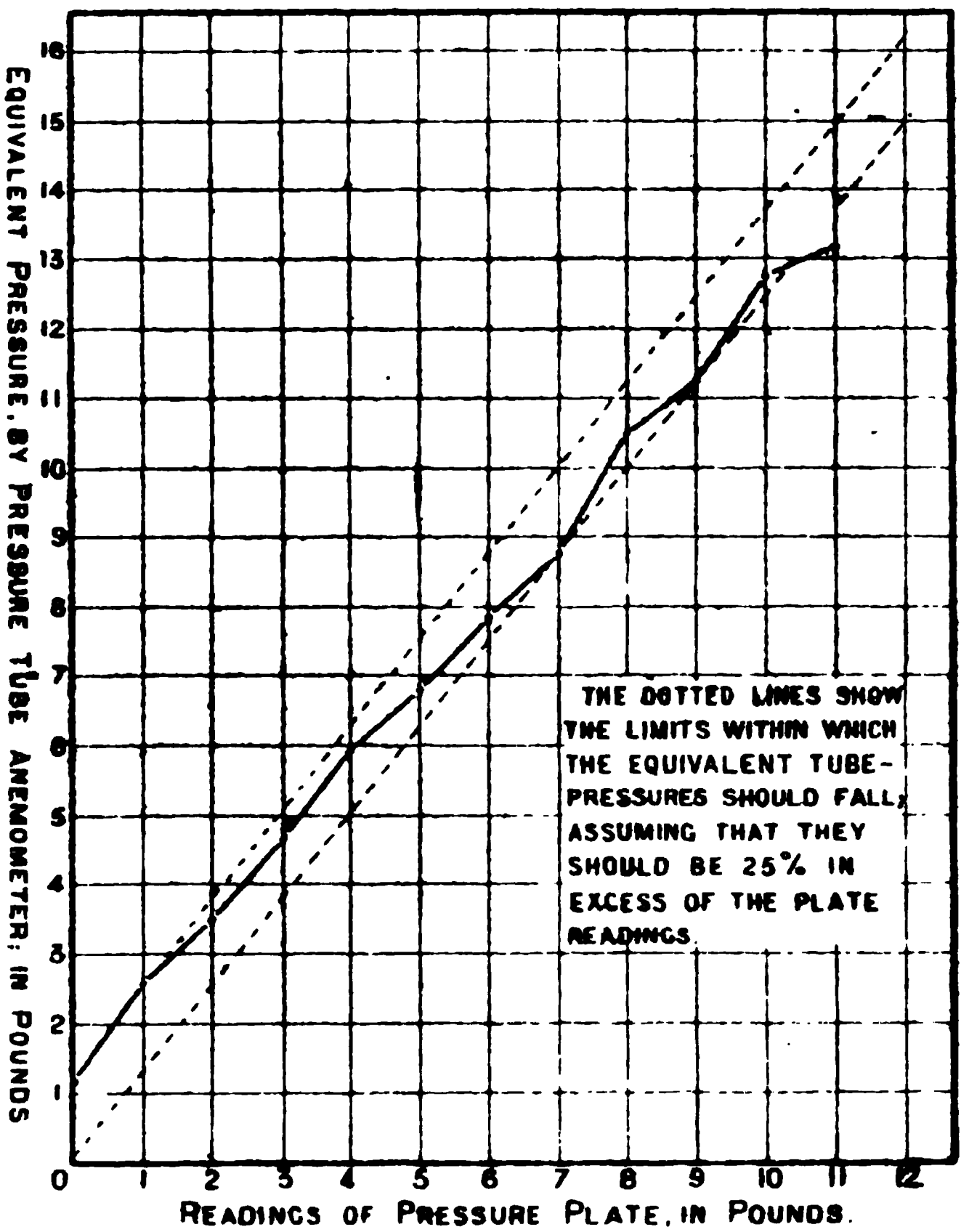
TABLE II.

SHOWING for each pound of Maximum Pressure recorded by the Pressure-Plate Anemometer, the corresponding Mean Maximum Pressure recorded by the Pressure-Tube Anemometer.

—	Reading of the pressure-plate, in pounds per square foot.												
	0	1	2	3	4	5	6	7	8	9	10	11	12
Mean equivalent pressure by pressure-tube.	1·16	2·57	3·44	4·69	5·93	6·76	7·84	8·73	10·55	11·23	12·7	13·1	—
No. of observations.	61	36	30	28	15	8	7	3	4	3	1	1	—

Speaking generally, it may be said that these equivalent tube values are all about 25 per cent. *above* the values actually recorded by the plate. It will be remembered that, from the construction of the instrument, increments of pressure of less than a pound are not registered; and therefore a given reading may always have been exceeded by any amount short of another pound, without such excess being registered. For example, a recorded pressure of 4 pounds must be taken as indicating that the effective pressure of the wind upon the plate not only reached that amount but may have been anything between it and 5 pounds. Bearing this in mind it will be seen from the diagram, Fig. V., that the equivalent pressures obtained by the comparison, so far as it has gone, fall very well between the limits above stated, after adding 25 per cent. to the actual readings of the spring. The friction of the moving parts, although very slight, is probably the cause of the rather higher equivalents obtained for the lowest pressures.

Fig. V.



The wind on striking a plane surface, such as the pressure-plate now used, does not exert all over it a uniform pressure, but a pressure

which diminishes from the centre to the edge, in a ratio determined by the size and shape of the surface, and probably by the strength of the air current also.* By placing a rim round the edge of the plate, so as to stop the ready outflow of air from its surface, the pressures recorded would be considerably increased for all winds; the conditions would then approximate closely with those which exist in the pressure-tube, and it is probable that the records of the two instruments would under those conditions nearly agree.

The number of observations with strong winds is as yet far too small to warrant the drawing of any final conclusions; but so far as the results of this comparison go at present, it seems pretty clear that with pressure-plate anemometers of the ordinary construction, the momentum of the plate has been the cause of some misconception as to the frequency with which high pressures are reached; and secondly, that, even when this source of error is guarded against, it is not safe to accept the records of anemometers of that type, as being reliable records of the wind-pressures actually experienced, until they have been corrected for the effect of the slipping of the air over their surfaces and past their edges. In the case of a circular plate of one square foot area there is reason to suppose that the loss of effective pressure upon the plate from this cause is equal to about 25 per cent. of the actual pressure the wind current is capable of exerting, but at present there are no data to show how this may be modified in the case of larger plates, or of plates of other shapes.

NOTE B.

Description of the Bridled Anemometer designed by Sir G. G. Stokes, Bart., F.R.S.

By Mr. R. H. Curtis.

Although the bridled anemometer has been at work ever since the year 1880 it does not appear that any detailed description of it has yet been published, the references to it which have been made from time to time in the publications of the Office having usually been very brief and general in character.

The portion of the instrument which is acted upon by the wind consists of five hemispherical copper cups, each of which is fixed by a short strong arm to a vertical spindle, around which they were originally placed equidistantly and in the same horizontal plane; after a time, however (in the year 1890), the cups were re-arranged spirally, so as to prevent any possibility of one cup sheltering another.

The special aim of Sir G. Stokes was to get a measure of the strength of the wind in gusts; and this he sought to do by attaching to the spindle a weight, which would have to be lifted as the spindle turned under the influence of the wind acting upon the cups, the weight being sufficiently heavy to prevent the cups from making a

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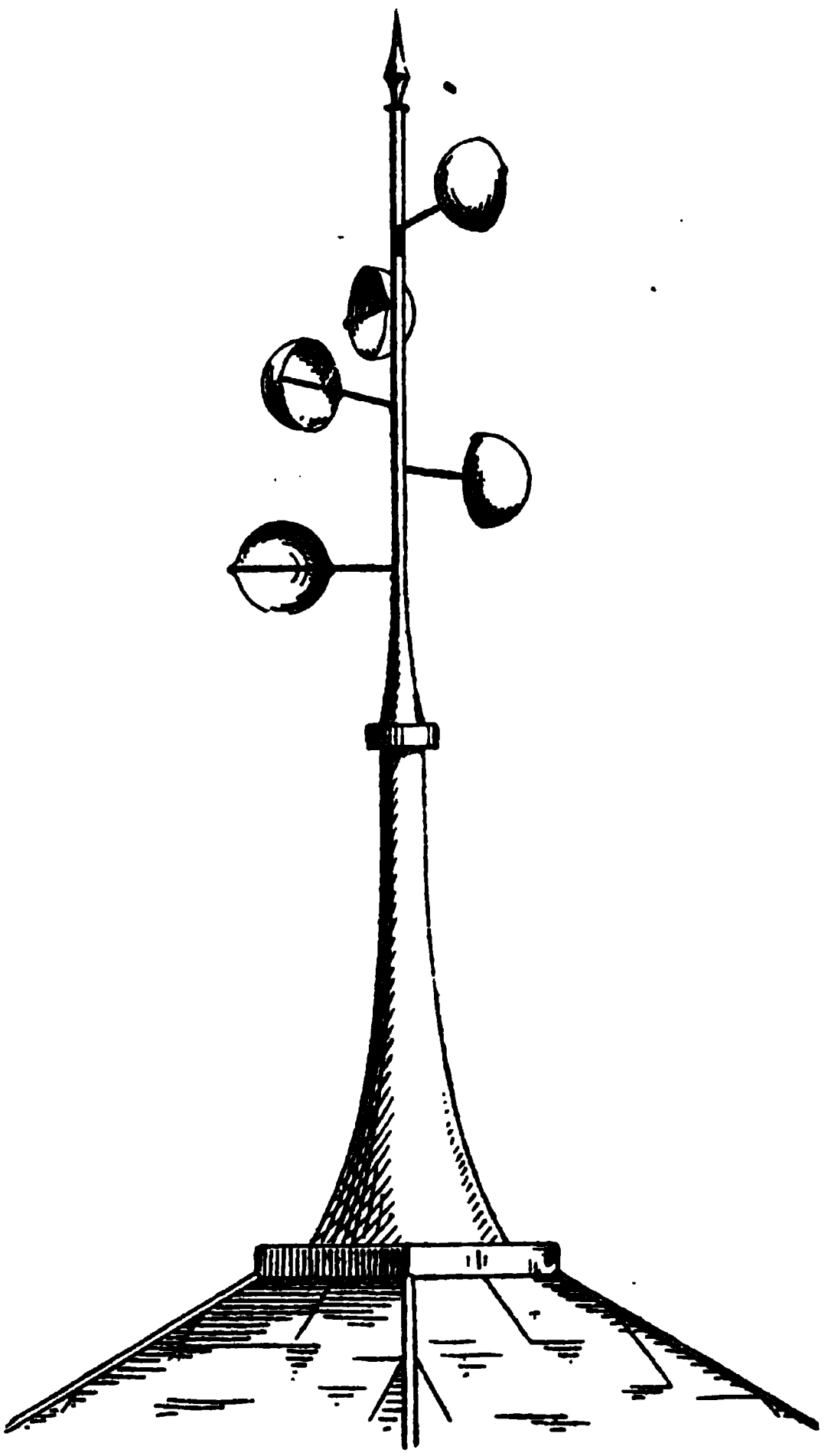
* *See* Quarterly Journal Royal Meteorological Society, Vols. VIII. and IX.

complete revolution in the strongest gust they would be likely to experience.

Fig. VI.



Exterior portion of the Bridled Anemometer showing the arrangement of the Cups.

To achieve this the spindle is brought, through bearings fitted with friction rollers, into the room in which the recording apparatus is placed, and its lower end is fitted with a pair of snails. The load to be lifted by the cups is divided into two equal parts, and is suspended on each side of the spindle by flexible cords, which pass from the spindle over a pulley to the weight, and back over another pulley to the spindle again, where each is fastened to the root of one of the snails. As the cups turn the weight is lifted, and the cord in each case is wound upon the periphery of the snail, the extra resistance thus gained being in accordance with the well-ascertained fact that the pressure of the wind varies with the square of the velocity; the record obtained is therefore one of velocity, and its scale is an uniform one throughout.

The record is secured in a very simple manner. Immediately below the spindle, and co-axial with it, is a cylinder, upon which a sheet of paper can be placed; and to the bottom of the spindle itself is fixed an arm, bent so as to allow it to sweep around the cylinder as the spindle turns, and having at its lower end a pen which can be kept in contact with the paper; the amplitude of every turn of the spindle is therefore shown by the length of the corresponding line the pen leaves upon the paper

The cylinder forms the driving weight of the clock by which its descent is regulated, and the abscissæ of the trace thus become the time-scale, while the horizontal ordinates give the force of the wind. By a simple arrangement the rate of descent of the cylinder can, if desired, be doubled, and the time-scale correspondingly opened, and this enlarged scale is generally employed in strong gales; there is also an arrangement by means of which the time-scale can be still further enlarged by substituting a hydraulic arrangement for the clock, but this is very rarely used.

Interior portion of the Bridled Anemometer showing the recording apparatus.

APPENDIX.

APPENDIX I.

List of Captains and Officers who have sent in Logs classed as "Excellent" during the year ending March 31, 1898. Figures are attached to the name of each observer to show the number of "Excellent" logs which he has supplied during the whole time of his co-operation with the Office.

Name of Captain or Officer.	Number of "Excellent" Logs.	Ship.
Alford, F.	5	S.S. Monarch.
Andersen, O. E....	17	S.S. Longhirst.
Angus, T. S.	17	S.S. Ballaarat and S.S. Britannia.
Barber, J.	1	S.S. Oanfa.
Beeching, C.	2	Barque Ellesmere.
Bolton, S. H.	23	S.S. Britannic.
Brewis, Sub-Lieut. C. R. W., R.N.	5	H.M.S. Penguin.
Constantine, T.	1	S.S. Don.
Crewe, E.	1	S.S. Victoria.
Dart, L. C.	17	Barque Alcides.
Davies, E. H.	2	S.S. Heraclides.
Dawson, Lieut. and Comr. W. P., R.N.	2	H.M.S. Waterwitch.
De la Garde. P., R.N. (Assistant Paymaster).	2	H.M.S. Waterwitch.
Dickinson, L. R.	1	S.S. Danube.
Dupen, P. P.	6	S.S. Cabenda.
England, T.	20	Barque Glen Grant.
Field, A. M., R.N.	20	H.M.S. Penguin.
Fraser, W. D.	9	Corolla.
Free T., R.N.R....	5	S.S. Cornwall.
Gibson, J.	1	S.S. Amber.
Glossop, Lieut. H. A. P., R.N.	9	H.M.S. Rambler.
Goodrham, H.	5	S.S. Woolloomooloo.
Greey, R., R.N.R.	3	S.S. Amber.
Hague, J. W.	1	S.S. Pretoria and S.S. Spartan.
Hepworth, M. W. C., R.N.R. ...	16	S.S. Aorangi.
Howard, Lieut. and Comr. W. V. S., R.N.	6	H.M S. Dart.
Jaggard, R.	1	S.S. Waimate.
Jamieson, D. E.	5	S.S. Port Chalmers.
Johnston, J.	1	Barque Blengfell.
Lewis, Lieut. A. W., R.N. ...	2	H.M.S. Penguin.
Lobb, Comr. F. J., R.N. ...	4	L.H. Tender Richmond.

Name of Captain or Officer.	Number of "Excellent" Logs.	Ship.
MacDonald, J.	1	Barque Marion Frazer.
May, Sub-Lieut. F., R.N. ...	2	H.M.S. Dart.
Millican, J. W.	14	S.S. Loughrigg Holme.
Milne, W. F.	13	S.S. Eclipse.
Milner, W. H.	26	S.S. Pará and S.S. Medway.
Moignard, P.	10	Garsdale.
Mullan, F. C., F.R.G.S. ...	3	S.S. Romney.
Nares, Lieut. G. E., R.N. ...	2	H.M.S. Penguin.
Nedden, H. zur	8	S.S. Madeline.
Norman, F.	10	Milton Stuart.
Pascoe, Lieut. F. C., R N. ...	2	H.M.S. Penguin.
Peebles, R.	22	S.S. Breconshire.
Richards, Capt. G. E., R.N. ...	9	H.M.S. Rambler.
Roberts, R.	1	S.S. Cabenda.
Ross, J.	1	Barque Alcides.
Sargent, A. H.	11	Pleione.
Scott, G., F.R.Met.Soc. ...	13	Buckingham.
Shanklin, J. W.	1	S.S. Ethiopia.
Simpson, Alexander	26	S.S. Thermopylæ.
—— Alexander	28	S.S. Traveller.
Smyth, Comr. M. H., R.N. ...	6	H.M.S. Egeria.
Thomas, H. G., R.N.R. ...	7	S.S. Yarrawonga.
Title, F.	1	Falls of Foyers.
Trott, S., F.R.Met.Soc. ...	35	S.S. Minia.
Turner, A. C., R.N.R.	1	S.S. Britannia.
Veale, E. A.	2	S.S. Ormuz and S.S. Lusitania.
Walker, H., R.N.R.	21	S.S. Campania.
Ward, W.	1	S.S. Argyll.
Watson, Sub-Lieut. H. C., R.N.	3	H.M.S. Egeria.
Waugh, Lieut. A., R.N. ...	2	H.M.S. Penguin.
Webster, T.	1	Centesima.
Wilson, J., R.N.R.	16	S.S. Anchoria.
Worcester, W. D. G., R.N.R. ...	9	S.S. Victoria and S.S. India.

APPENDIX II.

List of Meteorological Logs and Documents received from Ships.

Captain's Name.	Ship.	Voyage.	Year.	Officers who have assisted in keeping the Meteorological Log.
Alford, F.	H.M.T.S. Monarch ...	Off coasts of British Isles	1896–97	Messrs. Hart, Broadbridge, and Bordeaux.
Andersen, O. E. ...	S.S. Longhirst ...	Mediterranean Ports, Quebec, and Barcelona.	1897	C. Peterson, 1st Mate, and James Durham, 2nd Mate.
" " ...	" ...	Continental Ports	1897	———
Angus, T. S.	S.S. Ballaarat ...	Sydney, viâ Suez	1897	F. C. Hopkins, 4th Officer, W. Faulkener, 5th Officer, and H. J. Feaks, 6th Officer.
" "	" ...	" "	1897	F. S. Murray, 4th Officer, W. A. Faulkener, 5th Officer, and C. E. V. Shield, 6th Officer.
" "	S.S. Britannia ...	" "	1897–98	W. F. Cossey, 3rd Officer, M. B. Taylor, 4th Officer, and A. G. Mead, 5th Officer.
Barber, J.	S.S. Oanfa	China and Japan, viâ Suez	1897	Wm. C. Davison, Chief Officer, R. Munro, 2nd Officer, and R. J. Woodget, 3rd Officer.
Barker, D. W., R.N.R....	School Ship Worcester	Off Greenhithe	1897	The Cadets.
Beeching, Charles ...	Barque Ellesmere ...	Sydney and San Francisco	1896–97	Messrs. Stewart and Labatt, 1st and 2nd Officers.
Bolton, S. H.	S.S. Britannic ...	Continental Ports and New York ...	1897–98	W. S. Ireland. Chief Officer.
Bulkeley, T. D.... ...	S.S. Atrato	West Indies	1897	D. Findlay, 4th Officer, assisted by J. Bartlett, 3rd Officer, C. Garden, 4th Officer, C. K. Borisson, 5th Officer, and E. Seager, 5th Officer.
" "	"	West Indies	1897	———
Burton, G.	S.S. Rangatira ...	Wellington	1896–97	———
" Thomas ...	Ship Crusader ...	New Zealand...	1896–97	Messrs. Granquest and Musters.

LIST of METEOROLOGICAL LOGS and DOCUMENTS received from SHIPS—*continued.*

Captain's Name.	Ship.	Voyage.	Year.	Officers who have assisted in keeping the Meteorological Log.
Carey, F.	S.S. Lake Huron ...	Quebec	1897	Charles Parks.
Clarke, W. H.	S.S. Nomadic ...	New York	1897	F. W. Mace, 2nd Officer.
,, ,, ...	,, ...	,, ...	1897–98	F. W. Mace, 2nd Officer, and L. Thomson, 2nd Officer.
Clinock, T. C.	S.S. Harlech Castle ...	Cape Ports, Madagascar, and Mauritius...	1897	———
,, ,, ...	,, ,, ...	Cape Ports	1897	———
,, ,, ...	,, ,, ...	,, ...	1897	———
Cloke, J. F.	Barque Glenmark ...	Cape Town	1896	———
Combe, Comr. J. W., R.N.	H.M.S. Waterwitch...	Sydney, Fiji, and Albany	1896–97	Lieut. W. T. P. Wilson, R.N., and Sub-Lieut. B. O. M. Davy, R.N.
Constantine, Thomas ...	S.S. Don	West Indies	1897	J. Gavi, 3rd Officer, J. Watts, 4th Officer, and J. W. Matley, 5th Officer.
Crewe, E.	S.S. Victoria	Melbourne, viâ Suez	1897	J. C. Gibbons, 4th Officer, H. C. Pollitt, 3rd Officer, W. H. T. Warren, 5th Officer, W. Hayward, Chief Officer. H. G. Evans, 2nd Officer, S. Finch, Sup. 2nd Officer.
Dannreuther, Lieut. ...	H.M.S. Melita ...	Suakim, Port Said, Malta, and Constantinople.	1896	———
Dart, L. C.	Barque Alcides ...	New York, Yokohama, and San Francisco	1896	John Ross, Chief Officer, and J. V. Evans, 2nd Officer.
Davies, E. H.	S.S. Heraclides ...	River Plate	1896–97	J. P. Hall, 2nd Officer, assisted by G. Back, 3rd Officer, and W. Fry, 3rd Officer.
,, ,, ...	,, ...	,, ...	1897	J. P. Hall, assisted by W. MacMillan.
,, J. A.	S.S. Oanfa	China and Japan, viâ Suez	1897	W. C. Davidson, 1st Officer, J. Metcalfe, 2nd Officer, and W. E. Searle, 3rd Officer.
Dawson, Lieut. and Comr. W. P., R.N.	H.M.S. Waterwitch...	Off North Queensland	1897	Philip de la Garde, Assistant Paymaster.

Dawson, Lieut. and Comr. W. P., R.N.	H.M.S. Waterwitch ...	Surveying off North Coast of Queensland and to Sydney.	1897	P. de la Garde, Assistant Paymaster, J. Taylor, J. Featherstone, J. R. Bowering, P.O.'s 1st Class, J. H. Black, P.O. 2nd Class, Quartermaster.
Dickinson, L. R. ...	R.M.S. Danube ...	River Plate	1897–98	3rd, 4th, and 5th Officers.
Dupen, P. P.	S.S. Cabenda	West Coast of Africa	1897	John Lennox, 2nd Officer.
„ „	„	„ „	1897	W. F. Wood, 2nd Officer.
Dyer, E.	S.S. Lucerna	Batoum	1896–97	H. A. White, 2nd Mate.
England, Thomas ...	Barque Glen Grant ...	Quebec and Rio Janeiro	1896	———
„ „ ...	„ „ ...	Rio Janeiro, Apalachicola, and Quebec ...	1896–97	———
Field, Capt. A. M., R.N.	H.M.S. Penguin ...	At Australian Station	1896–97	Lieut. C. R. W. Brewis, R.N.
„ „ „ ...	„ ...	Sydney, Suva, Fanning Island, &c. ...	1897	Lieuts. F. C. Pasco, A. Waugh, G. E. Nares, A. W. Lowis, C. Brewis; Mr. F. Payne, Boatswain; P.O.'s 1st Class T. Dinham, G. Tye, A. Lutchford, and G. Bailey.
„ „ „ ...	„ ...	At Fanning Island, Honolulu, and Suva	1897	Lieuts. C. Brewis, F. C. Pasco, A. Waugh, G. Nares, A. Lowis; Mr. F. Payne. Boatswain; T. Dinham, A. Lutchford, G. Tye, G. Bailey, and C. Day, P.O.'s 1st Class.
Forbes, D. S.	Ship Dunfermline ...	San Francisco, Philadelphia, Calcutta, and New York.	1891–95	———
Fraser, W. D.	Ship Corolla	Cape Town, Newcastle (N.S.W.), Honolulu, Port Townsend, and Fremantle.	1895–97	W. E. Gardiner.
Free, Thomas, R.N.R. ...	S.S. Cornwall ...	Albany, viâ Cape Good Hope, and Monte Video.	1897	G. Reginald Barter, 1st Mate, T. E. Cutter, 2nd Officer, Percy Spray, 3rd Officer, and W. Howell, 4th Officer.
Gadd, C.	S.S. Valetta	Sydney, viâ Suez	1897	C. Talbot, W. G. Baker, R. P. Dalton, H. Walpole, E. H. Orchard, and A. Bramwell.
Gibson, James	S.S. Amber	Red Sea and at Bombay	1897	G. C. Hogg, 1st Officer, D. P. Morrell, 2nd Officer, and W. F. R. Mist, 3rd Officer.

List of Meteorological Logs and Documents received from Ships—*continued.*

Captain's Name.	Ship.	Voyage.	Year.	Officers who have assisted in keeping the Meteorological Log.
Carey, F.	S.S. Lake Huron ...	Quebec	1897	Charles Parks.
Clarke, W. H.	S.S. Nomadic ...	New York	1897	F. W. Mace, 2nd Officer.
,, ,, ...	,, ...	,, ...	1897–98	F. W. Mace, 2nd Officer, and L. Thomson, 2nd Officer.
Clinock, T. C.	S.S. Harlech Castle ...	Cape Ports, Madagascar, and Mauritius...	1897	——
,, ,, ...	,, ,, ...	Cape Ports	1897	——
,, ,, ...	,, ,, ...	,, ...	1897	——
Cloke, J. F.	Barque Glenmark ...	Cape Town	1896	——
Combe, Comr. J. W., R.N.	H.M.S. Waterwitch...	Sydney, Fiji, and Albany	1896–97	Lieut. W. T. P. Wilson, R.N., and Sub-Lieut. B. O. M. Davy, R.N.
Constantine, Thomas ...	S.S. Don	West Indies	1897	J. Gavi, 3rd Officer, J. Watts, 4th Officer, and J. W. Matley, 5th Officer.
Crewe, E.	S.S. Victoria	Melbourne, viâ Suez	1897	J. C. Gibbons, 4th Officer, H. C. Pollitt, 3rd Officer, W. H. T. Warren, 5th Officer, W. Hayward, Chief Officer, H. G. Evans, 2nd Officer, S. Finch, Sup. 2nd Officer.
Dannreuther, Lieut. ...	H.M.S. Melita ...	Suakim, Port Said, Malta, and Constantinople.	1896	——
Dart, L. C.	Barque Alcides ...	New York, Yokohama, and San Francisco	1896	John Ross, Chief Officer, and J. V. Evans, 2nd Officer.
Davies, E. H.	S.S. Heraclides ...	River Plate	1896–97	J. P. Hall, 2nd Officer, assisted by G. Back, 3rd Officer, and W. Fry, 3rd Officer.
,, J. ,, ...	,, ...	,, ...	1897	J. P. Hall, assisted by W. MacMillan.
,, J. A.	S.S. Oanfa	China and Japan, viâ Suez	1897	W. C. Davidson, 1st Officer, J. Metcalfe, 2nd Officer, and W. E. Searle, 3rd Officer.
Dawson, Lieut. and Comr. W. P., R.N.	H.M.S. Waterwitch ...	Off North Queensland	1897	Philip de la Garde, Assistant Paymaster.

Dawson, Lieut. and Comr. W. P., R.N.	H.M.S. Waterwitch ...	Surveying off North Coast of Queensland and to Sydney.	1897	P. de la Garde, Assistant Paymaster, J. Taylor, J. Featherstone, J. R. Bowering, P.O.'s 1st Class, J. H. Black, P.O. 2nd Class, Quartermaster.
Dickinson, L. R. ...	R.M.S. Danube ...	River Plate	1897–98	3rd, 4th, and 5th Officers.
Dupen, P. P.	S.S. Cabenda	West Coast of Africa	1897	John Lennox, 2nd Officer.
„ „	„	„ „	1897	W. F. Wood, 2nd Officer.
Dyer, E.	S.S. Lucerna	Batoum	1896–97	H. A. White, 2nd Mate.
England, Thomas ...	Barque Glen Grant ...	Quebec and Rio Janeiro	1896	———
„ „ ...	„ „ ...	Rio Janeiro, Apalachicola, and Quebec ...	1896–97	———
Field, Capt. A. M., R.N.	H.M.S. Penguin ...	At Australian Station	1896–97	Lieut. C. R. W. Brewis, R.N.
„ „ „ ...	„ ...	Sydney, Suva, Fanning Island, &c. ...	1897	Lieuts. F. C. Pasco, A. Waugh, G. E. Nares, A. W. Lowis; Mr. F. Payne, Boatswain; P.O.'s 1st Class T. Dinham, G. Tye, A. Lutchford, and G. Bailey.
„ „ „ ...	„ ...	At Fanning Island, Honolulu, and Suva	1897	Lieuts. C. Brewis, F. C. Pasco, A. Waugh, G. Nares, A. Lowis; Mr. F. Payne. Boatswain; T. Dinham, A. Lutchford, G. Tye, G. Bailey, and C. Day, P.O.'s 1st Class.
Forbes, D. S.	Ship Dunfermline ...	San Francisco, Philadelphia, Calcutta, and New York.	1891–95	———
Fraser, W. D.	Ship Corolla	Cape Town, Newcastle (N.S.W.), Honolulu, Port Townsend, and Fremantle.	1895–97	W. E. Gardiner.
Free, Thomas, R.N.R. ...	S.S. Cornwall ...	Albany, viâ Cape Good Hope, and Monte Video.	1897	G. Reginald Barter, 1st Mate, T. E. Cutter, 2nd Officer, Percy Spray, 3rd Officer, and W. Howell, 4th Officer.
Gadd, C.	S.S. Valetta	Sydney, viâ Suez	1897	C. Talbot, W. G. Baker, R. P. Dalton, H. Walpole, E. H. Orchard, and A. Bramwell.
Gibson, James	S.S. Amber	Red Sea and at Bombay	1897	G. C. Hogg, 1st Officer, D. P. Morrell, 2nd Officer, and W. F. R. Mist, 3rd Officer.

LIST of METEOROLOGICAL LOGS and DOCUMENTS received from SHIPS—*continued.*

Captain's Name.	Ship.	Voyage.	Year.	Officers who have assisted in keeping the Meteorological Log.
Goodrham, Henry ...	S.S. Woolloomooloo ...	Adelaide, viâ Cape Good Hope	1897	Henry Reay, 2nd Officer, C. Phillips, 3rd Officer, and A. C. Godley, 4th Officer.
" ...	" " ...	" " "	1897	Alfred Rogers, Chief Officer, H. Reay, 2nd Officer, E. Tucker, 3rd Officer, and C. Trumper, 4th Officer.
Greey, Robert, R.N.R....	S.S. Amber	Suez, Suakim, Aden, and Perim	1896–97	J. Gibson, G. C. G. Hogg, H. Delves Clough, and W. F. R. Mist.
" " " ...	"	In Red Sea	1897	J. Gibson, 1st Officer, G. C. G. Hogg, 2nd Officer, W. F. R. Mist, 3rd Officer, and H. D. Clough, 3rd Officer.
" " " ...	"	Red Sea and at Bombay	1897	Gilbert C. Hogg, 1st Officer, D. P. Morrell, 2nd Officer, and Wm. F. R. Mist, 3rd Officer.
Griffin, E. J., R.N.R. ...	S.S. Moor	Cape Town	1897	H. D. Watts Russell, 4th Officer.
" " " ...	"	"	1897	H. B. Rake, 4th Officer.
Haddock, H. J., R.N.R.	R.M.S. Britannic ...	New York	1897	
Hague, J. W., R.N.R. ...	S.S. Mexican	Cape Town	1897	A. Williams, R.N.R., 2nd Officer, F. Girdler Browne, 3rd Officer, and G. Weigall, 4th Officer.
" "	S.S. Pretoria	"	1896–97	E. G. Leader, Chief Officer, assisted by G. Grogan, 2nd Officer, S. M. Day, 3rd Officer, W. H. Cooper, 4th Officer, and F. O'Sullivan, Captain's Clerk.
" "	S.S. Spartan	"	1897	Do. do.
Hepworth, M. W. C., R.N.R.	S.S. Aorangi	Cape Town, Sydney, Vancouver, and Honolulu.	1897	J. W. Lawrence, S. Phillips, R. M. Reader, G. M. Hammon, F. J. Bayldon, and S. Pearson.
" " "	"	Honolulu, Vancouver, Suva, Wellington, and Sydney.	1897–98	S. Phillips, Chief Officer, R. M. Reader, 2nd Officer, F. G. Bayldon, 3rd Officer, and S. Pearson, 4th Officer.

Hogan, J.	Ship Chrysomene ...	Melbourne, Newcastle (N.S.W.), and San Francisco.	1896–97	W. H. Jackson, 2nd Officer.
Howard, Lieut. and Comr. W. V. S., R.N.	H.M.S. Dart	Surveying off Queensland	1897	Lieut. Francis May, R.N., assisted by Wm. Winsor, Wm. Foster, H. Burton, and T. Miller, Quartermasters.
Jaggard, Russell ...	S.S. Waimate ...	New Zealand, viâ Cape, and Pernambuco	1896–97	B. D. Parnell, 4th Officer.
„ „ ...	„ ...	Wellington, viâ Cape Good Hope... ...	1897–98	W. K. McAlpine.
Jamieson, D. E. ...	S.S. Port Chalmers ...	Melbourne, viâ Cape, and home, viâ Suez	1896–97	Frederick Tunbridge, assisted by W. Plugge and H. R. Lesslie.
„ „ ...	„ „ ...	Adelaide, viâ Cape Good Hope, and home, viâ Suez.	1897	W. Plugge, T. F. Dixon, and R. Bailey.
Johnston, John ...	Barque Blengfell ...	Brisbane, Valparaiso, and New York ...	1895–97	Henry Fisher.
Jones, Evan	Barque Moel Tryvan	Melbourne	1896–97	———
„ R. Q.	S.S. Vancouver ...	Quebec	1897	J. V. Mathias and John Davies.
„ „	„ ...	Portland	1897–98	John Davies, 4th Officer.
„ T. I., R.N.R. ...	S.S. Bovic	New York	1897–98	E. Kemp, J. C. Hamilton, R.N.R., and James McGiffin.
Kelly, —	Barque Lutterworth	Wellington	1895–97	Mr. Blanchard, Chief Officer.
„ R.	Ship Westland ...	„	1896–97	———
Lawson, —	S.S. Lisnacrieve ...	Newport News	1897	H. A. White, 2nd Mate.
Lindsay, H. K.	Barque Laurelbank...	Sydney and San Francisco	1895–97	———
Lobb, Commr. F.J., R.N.	L.H. Tender Richmond	At Bahamas	1896–97	F. W. Holden, Chief Officer.
„ James „ „	S.S. „ „	„	1897	
Lowe, James	S.S. Duffield	Philadelphia and New York	1897	F. A. White, 2nd Officer.
MacDonald, J.	Barque Marion Frazer	Iquique	1896–97	J. C. Wallace, Chief Officer,
Martin, T. C.	Ship Loch Tay ...	Adelaide	1896–97	———
Martyr, J. W. C. ...	S.S. Europa	Colon, and Newport News...	1896–97	H. T. Wilde, 3rd Officer.
„ „ ...	„	La Plata	1897	Percy Brining, 3rd Officer.
Miller, Lieut. A.T., R.N.	School Ship Conway	Off Birkenhead	1897	The Cadets.
Millican, J. W.... ...	S.S. Loughrigg Holme	Alexandria and Canada	1897	S. J. Holme, J. Eland, E. Russell, and E. Gibson.

List of Meteorological Logs and Documents received from Ships—*continued.*

Captain's Name.	Ship.	Voyage.	Year.	Officers who have assisted in keepin the Meteorological Log.
Milne, W. F.	S.S. Eclipse	Davis Straits...	1897	———
Milner, W. H.	S.S. Pará	West Indies	1897	J. Watts, 5th Officer.
,, ,, ...	S.S. Medway	West Indies and Colon	1897	———
Mitchell, George ...	S.S. California ...	Mediterranean and New York	1896–97	———
,, ,, ...	,, ...	,, ...	1897	———
Moignard, Phillip ...	Ship Garsdale ...	Cape Town, Newcastle (N.S.W.), Antafogasta (Chile).	1896–97	Mr. King, Chief Officer.
Mosely, F. J., R.N.R. ...	S.S. Trojan	Cape Town	1897	F. G. Brown, 4th Officer.
Mullan, F. C.	S.S. Romney	China and Japan, viâ Suez	1896–97	John Hunter, W. H. Davies, and Enoch Jones.
Nasbet, J. R., R.N.R. ...	S.S. Elphinstone ...	Borneo, viâ Suez	1897	W. W. Sharpley, 1st Officer, D. G. Taylor, 2nd Officer, and A. Dransfield, 3rd Officer.
Nedden, H. zur... ...	S.S. Madeline ...	Newport News and West Bay (U.S.) ...	1897	N. Traill, 2nd Mate.
,, ,, ...	,, ...	Quebec	1897	H. Duncan, 2nd Mate.
Neilson, N. R.	S.S. Guelph	Cape Town	1897	Messrs. Kerbey, Grogan, and Campos.
Norman, F.	Barque Milton Stuart	New York and Calcutta	1896–97	R. Cole Baker, 3rd Officer, and Stuart Matthews.
Owen, Hugh, R.N.R. ...	S.S. Larne	Jamaica	1898	———
Patterson, J. A. ...	Ship Dunstaffnage ...	Philadelphia and Calcutta	1895–97	G. Kell, 2nd Mate.
Pattman, R.	Barque Loch Torridon	Newcastle, N.S.W.	1896–97	J. G. Minnis, 1st Mate, and David Forrest, 2nd Mate.
Peebles, R.	S.S. Breconshire ...	China and New York, viâ Suez	1896–97	G. Elliott and W. Matthews.
,, ...	,, ...	New York, China, Japan, viâ Suez, and Calcutta.	1897–98	Do. do.
Richards, Comr. G. E., R.N.	H.M.S. Rambler ...	Halifax and Bermuda	1897	Lieut. H. A. P. Glossop, R.N.
,, ,, ,,	,, ...	Belize, Bermuda, and Halifax	1897	,, ,, ,,

Richards, Comr. G. E., R.N.	H.M.S. Rambler ...	Halifax and Straits of Belle Isle	1897	Lieut. H. A. P. Glossop, R.N.
Roberts, R.	S.S. Cabenda	West Coast of Africa	1897	W. F. Wood and J. G. J. Ross.
Rogers, W. B.	Barque Routenbeck...	Honolulu and Lobos de Afuera	1896–97	F. Catlow.
Ross, John	Barque Alcides ...	San Francisco	1897	W. H. Halliday, Chief Officer, and Frank F. Lurcock, 2nd Officer.
Russell, J.	S.S. Chaucer	West Coast of South America	1897–98	Alfred Gittins 2nd Officer.
Sampson, Comr. L. D., R.N.	H.M.S. Swallow ...	At Zanzibar, Simon's Bay, and Mombasa	1893	Surgeon W. E. Home, R.N.
Sargent, A. H.	Ship Pleione	New Zealand...	1896-97	G. H. B. Wood, Chief Officer, and F. Powell, 2nd Officer.
Scott, George, F.R. Met. Soc.	Ship Buckingham . .	Sydney	1896–97	W. Bourke, Chief Officer, and J. Maudsley, 2nd Officer.
Shanklin, J. W. ...	S.S. Ethiopia... ...	New York	1896–97	———
Shepherd, D.	Ship Frankistan ...	San Francisco	1896–97	F. Jackson.
Simpson, Alexander ...	S.S. Thermopylæ ...	Sydney, viâ Cape Town	1897	W. Douglas, Chief Officer, J. Paterson, 2nd Officer, and W. Jermyn, 3rd Officer.
" " ...	" ...	" "	1897	Do. do.
" " ...	" ...	" "	1897–98	Do do.
Simpson, Alexander ...	Barquentine Traveller	... ...	1897	———
Singer, P. R.	S.S. Den of Airlie ...	Suez	1897	F. Woollcott, 3rd Officer.
Smyth, Comr. M. H., R.N.	H.M.S. Egeria ...	; Video, and Puerto Bueno (Sarmiesito Channel).	1897	Sub-Lieut. H. C. Watson, R.N.
" "	" ...	West Coast of South America	1897	Sub-Lieut. H. C. Watson, R.N., and the Quartermasters.
" "	" ...	Off West Coast of South America, Central America, and San Francisco.	1897–98	Do. do.
Stephens, T.	S.S. Catalonia ...	Boston	1897	R. A. C. Johnson, Murdoch Cunningham, and Ward, 3rd and 4th Officers.
Steven, G. H.	Ship Dharwar ...	Melbourne	1895–96	Chief Officer.
Suffern, R.	Barque Craigerne ...	Cape Town, Newcastle (N.S.W.), and Portland (Oregon).	1896–98	G. M. Collie, 1st Officer, and R. Gregson, 2nd Officer.

LIST of METEOROLOGICAL LOGS and DOCUMENTS received from SHIPS—*continued.*

Captain's Name.	Ship.	Voyage.	Year.	Officers who have assisted in keeping the Meteorological Log.
Thomas, H. G., R.N.R....	S.S. Yarrawonga ...	Adelaide, viâ Cape Good Hope	1897	L. Gibbs, 2nd Officer, Free, 3rd Officer, and H. Sandeman, 4th Officer.
,, ,, ,, ...	,, ...	Batavia and Cookstown, viâ Suez ...	1897-98	Do. do.
,, Wm.	S.S. Templemore ...	Baltimore	1897-98	H. P. Harris, 1st Officer, A. W. McKenny, 2nd Officer, and G. Greig, 3rd Officer.
Thomson, W. S. ...	S.S. Macduff	China, Japan, and New York, viâ Suez ...	1897-98	———
Title, F.	Ship Falls of Foyers	New York, Melbourne, Newcastle (N.S.W.), and San Francisco.	1896-97	J. W. Read, Chief Officer.
Trenaman, R. W. ...	S.S. Lassell	Bahia and New York	1897	Alfred Gittins, 2nd Officer.
,, ,, ...	,, ...	Rio Janeiro and New York	1897-98	R. J. Kite, 2nd Officer.
Trott, Samuel F.R. Met. Soc.	S.S. Minia	In the North Atlantic	1897	W. G. Squares, Chief Officer, J. Adams, Navigating Officer, E. R. Williams, 2nd Officer, and F. C. Jeffries, 3rd Officer.
,, ,, ...	,, ...	Halifax and North Atlantic	1897-98	Do. do.
Turner, A. C., R.N.R. ...	S.S. Britannia ...	Calcutta, viâ Suez	1897	James Young, 3rd Officer.
,, ,, ,, ...	,, ...	Bombay and New York, viâ Suez ...	1897	A. W. Thomson.
,, ,, ,, ...	,, ...	Bombay, viâ Suez	1897-98	James Young, 3rd Officer.
Tyson, John	S.S. Guelph	Cape Town	1896-97	———
,, ,, ...	S.S. Tartar	,, ...	1897	———
Vaughan, James ...	Barque Sokoto ...	San Francisco	1896-97	Richard Jones, Chief Officer, and Geo. B. Durrant, 2nd Officer.
Veale, E. A.	S.S. Lusitania ...	Sydney, viâ Suez	1897	B. L. Gace, Chief Officer, W. L. Shelford, 2nd Officer, O. Lockyer, 3rd Officer, and C. Cullimore, 4th Officer.
,, ,, ...	S.S. Ormuz	,, ,, ...	1897	E. J. Tayler, assisted by F. W. Kershaw and G. H. Jones.

Wadsworth, F. H. ...	S.S. Ethiopia... ...	New York	1897–98	W. B. Rome, 4th Officer.
Walker, H, R.N.R. ...	R.M.S. Campania ...	„	1897–98	C. A. Smith, W. Irvine, W. Hankinson, E. H. Penticost, C. Nelson, C. Unwin, and Wm. McMickan.
Ward, W.	S.S. Argyll	China and New York, viâ Suez	1897	S. L. Saxby, Chief Officer, J. Elliott, 2nd Officer, and C. Gumley, 3rd Officer.
Watt, H. F.	Barque Elissa ...	Laguna (Mexico) and Key West	1895–97	———
Webster, T.	Ship Centesima ...	San Francisco	1896–98	———
Williams, J. O.... ...	S.S. Norseman ...	Boston	1897	Thomas James, 2nd Officer.
Williamson, J. C. ...	S.S. Lennox	China and Japan, viâ Suez, New York, and San Francisco.	1895–96	James Elliott, 3rd Officer.
Wilson, John, R.N.R. ...	S.S. Anchoria ...	New York	1896–97	W. M. Shannon and D. Skinner, 3rd Officers.
„ „ „ ...	„ ...	„	1897	David Kinnear, 3rd Officer.
„ „ „ ...	„ ...	„	1897–98	„ „
Worcester, W. D. G., R.N.R.	S.S. Victoria	Bombay, viâ Suez	1896–97	———
„ „	„	Adelaide, viâ Suez	1897	W. H. Sweny, 2nd Officer, W. Hayward, Chief Officer, M. Burne, 3rd Officer, and T. H. Hodson, 5th Officer.
„ „	S.S. India	Bombay, viâ Suez	1897	R. Stevenson, Sup. 2nd Officer, assisted by A. W. Symes, Chief Officer, E. B. Bartlett. 2nd Officer, L. M. Gordon, 4th Officer, and W. Hallam, Sup. 4th Officer.
„ „	„	„ „	1897–98	H. W. M. Atkinson, Super. 2nd Officer, assisted by A. W. Symes. R.N.R., Chief Officer, E. B. Bartlett, R.N.R., 2nd Officer, C. N. Redhead, R.N.R., 3rd Officer, S. Stroud, R.N.R., 4th Officer, and R. T. Hodgson, Super. 4th Officer.

APPENDIX III.

INSTRUMENTS supplied, &c., to the Royal Navy.

Per Account.	Barometers.	Aneroids.	Thermometers.				Hydrometers.
			Ordinary.	Max.	Min.	Screens.	
April 1st, 1897, afloat ...	239	622	1,459	392	397	237	47
Issued since	101	200	465	99	92	37	16
	340	822	1,924	491	489	274	63
Returned since	105	207	462	102	93	36	—
April 1st, 1898, afloat ...	235	615	1,462	389	391	238	63

INSTRUMENTS supplied, &c., for use at Naval Stations.

April 1st, 1897, in use ...	74	74	242	33	47	10	11
Issued since	6	10	45	2	—	1	4
	80	84	287	35	47	11	15
Returned since	6	5	40	1	1	1	4
April 1st, 1898, in use ...	74	79	247	34	46	10	11

DISPOSITION of ADMIRALTY INSTRUMENTS on April 1st, 1898.

Afloat in Royal Navy ...	235	615	1,462	389	391	238	63
In use at stations	74	79	247	34	46	10	11
In store at M.O.	67	126	89	104	115	34	31
„ Chatham	17	48	106	29	34	24	15
„ Sheerness ...	3	17	32	12	12	8	6
„ Portsmouth ...	22	50	139	48	51	24	4
„ Devonport ...	16	35	127	34	35	17	16
„ Queenstown ...	3	2	11	3	3	—	4
„ Gibraltar... ...	3	2	7	3	3	—	4
„ Malta	10	17	51	12	8	5	6
„ Bombay	3	2	15	3	4	2	4
„ Halifax	6	6	22	4	4	2	7
„ Bermuda ...	7	16	21	5	9	2	—
„ Jamaica	2	3	19	2	2	1	3
„ Cape of Good Hope	7	5	25	5	4	3	4
„ Trincomalee ...	4	6	4	2	3	1	4
„ Hong Kong ...	19	16	53	20	21	3	21
„ Coquimbo ...	3	5	8	4	3	1	19
„ Sydney	4	8	18	4	—	3	23
„ Esquimalt ...	4	6	17	3	6	2	4
Total April 1st, 1898 ...	509	1064	2473	720	754	380	249
Lost, &c., since April 1st, 1897	—	4	295	38	33	25	—
Under repair, April 1st, 1898	7	—	—	—	—	—	—

APPENDIX IV.

INSTRUMENTS supplied, &c., to Mercantile Marine.

Per Account.	Barometers.	Compasses.	Thermometers.				Hydrometers.
			Ordinary.	Max.	Min.	Screens.	
April 1st, 1897, afloat ...	108	—	642	—	1	100	356
Issued since	69	—	434	—	—	54	229
	177	—	1,076	—	1	154	585
Returned since	59	—	361	—	—	47	185
April 1st, 1898, afloat ...	118	—	715	—	1	107	400
April 1st, 1897, in use ...	299	2	292	62	73	58	13
Issued since	18	1	18	6	5	4	5
	317	3	310	68	78	62	18
Returned since	15	1	18	4	10	4	8
April 1st, 1898, in use ...	302*	2	292	64	68	58	10

INSTRUMENTS at Stations, viz., Telegraphic Reporting Stations, Observatories, Fishing Villages, &c.

DISPOSITION of INSTRUMENTS on April 1st, 1898.

In merchant ships	118	—	715	—	1	107	406
„ use at stations	302	2	292	64	68	58	10
„ store at M.O.	39	3	227	38	57	65	94
At Liverpool Agency ...	8	—	27	—	—	8	14
„ Glasgow „ ...	4	—	38	—	—	4	12
„ Dundee „ ...	3	—	14	—	—	5	14
„ Hull „ ...	2	—	12	—	—	2	7
„ Cardiff „ ...	6	—	12	—	—	4	30
„ Southampton „ ...	6	—	28	—	—	8	25
Total, April 1st, 1898 ...	488	5	1,365	102	126	261	612
Lost, &c., since April 1st, 1897	4	—	98	3	7	12	33
Under repair, April 1st, 1898	7	—	—	—	—	—	—

* Of these barometers 215 are lent for use of seafaring communities at fishing villages and ports.

APPENDIX V.

Report of Inspection of Stations in Ireland and South Wales, 1897.

I have to report that I have completed my tour over these districts, omitting only such stations (Valencia excepted) as were visited by Mr. Baker from Kew, and in addition Dublin (Fitz William Square), Curry-grane (Co. Longford), Killarney, Edenfel (Omagh), and St. David's. I was also unable to visit Cavan, where Lord Farnham is about to establish a station. This last omission was owing to a fatal accident which occurred to his son two days before my intended visit.

Donaghadee, visited September 16th.—This station calls for no particular remark. The observer may possibly give up the postmaster-ship, but would be ready to continue the duties of reporting to the Office.

Lissan, visited September 17th.—This station is in good order. The observer is the coachman, who is very careful and attentive, but cannot be expected to keep a very close watch on the instrument all day.

Londonderry, visited September 20th.—The defects as to the exposure of thermometers and rain gauge still exist, and I see no prospects of their being diminished. The observer is, however, careful; he is an ex-sergeant Royal Engineers.

Malin Head, visited September 21st.—The observer is Lloyds reporter, J. Williams. I found all instruments in good order. I paid special attention to the barometer, having taken with me a barometer, M.O. 579, with tube practically uncontracted. I found the two barometers at the station to read as follows:—

—	Scott.		Williams.	
Reporting instrument 68	29·626	59°	29·626	59°
Check 592	29·610	59	29·610	59

I then dismounted No. 592 and hung No. 579 in its place, and left it for two hours to take the temperature of the room.

At the expiration of that time readings were taken as follows:—

—	Scott.		Williams.	
No. 68	29·628	57°2	29·630	57°2
No. 579	29·630	57·2	29·624	57·2
No. 68	29·628	57·2	29·630	57·2
No. 579	29·626	57·2	29·624	57·2

These readings appear to show that the Malin Head barometer, at noon, does not read too low when compared with an uncontracted tube.

Markree, visited September 23rd.—Dr. Marth, the observer at this station, died in August; the observations for the present are taken by Miss Ellen Reynolds, who has for some years acted as Dr. Marth's assistant. The future of the observatory is not yet settled, but I hope

the meteorological observations will not be dropped. The instruments were clean and in good order.

Belmullet, visited September 25th.—The duty of reporting at this station has not been satisfactorily performed, and I therefore, with consent of the Admiral Superintendent of Naval Reserves, and after conversation with Mr. Hudson, the Inspecting-Officer of Coast Guard for the district, drove down on the 27th to Blacksod, 12 miles from Belmullet. The coastguard station is not exposed to the Atlantic, being round the point and in the bay; however, there is no high land about except a hill to the WNW., and the winds felt would be fairly true. There is a good expanse of water in sight to show sea disturbance. I saw Mr. Jones, the chief officer at Blacksod. He expressed his readiness to undertake the work, if the observer at Belmullet did not show more zeal and attention than has hitherto been exhibited.

The instruments at Belmullet were fairly clean.

Glasnevin, visited September 30th.—This station calls for no special remark.

Newcastle (*Co. Wicklow*), visited October 2nd.—This is the Consumption Hospital for Ireland. I had visited it last year.—Dr. Steede, the resident physician, had received the instruments, but had not as yet received full instructions in their use, but I have every hope that now the records will be started on a proper basis. The site is very good, except that the Wicklow Hills will intercept evening sunshine.

Valencia, visited October 5th.—The instruments are in good order, as usual. The only matter to which I have to call the attention of the Council is the state of the outside fence along the road, as this is only of clay, cattle break it down, and "pitching" with stones on top is not effectual. Persons sending in cattle for grazing complain of this.

Roche's Point, visited October 6th.—I found that the maximum thermometer had been recently broken and had not been replaced prior to my visit, and the rain-gauge was nearly worn out.

Mount Trenchard, visited October 7th.—This is a station for the Weekly Weather Report. The rain-gauge was rather sheltered by long grass. The thermometers were in good order.

Parsonstown, visited October 8th.—The two observers at this station at present are very careful and dependable. The instruments are in good order.

Kilkenny, visited October 9th.—A considerable improvement has been carried out at this Weekly Weather Report station, as Lord Ormonde has allowed the removal of the thermometer screen to a much more open site than was formerly available.

St. Anne's Head, visited October 11th.—This station calls for no special remark, the observations continue to be satisfactory.

Llandovery, visited October 13.—At this Weekly Weather Report station I have succeeded in getting improved instruments taken into use, with a promise of the erection of a better class of thermometer screen.

I also visited certain towns where the sanitary authorities contemplate the establishment of stations.

Belfast, visited September 16th.—I saw Mr. James O'Neill, who takes a great interest in the subject. The observations are to be

carried out by the staff of the Linen Hall Library, and the thermometer screen and rain-gauge erected in the open space formerly enclosed by the Linen Hall, now removed. There are some very good instruments, particularly a standard barometer, and observations exist for about 100 years, but the conditions were not satisfactory throughout.

Kingstown, visited September 30th.—I met Dr. Byrne Power and Colonel Blood, the chairman of the Sanitary Committee of the Town Council. It is proposed to establish a station in the People's Park at Glasthule near Kingstown. I was unable to see the instruments as the man who had charge of them was on leave.

Tenby, visited October 12th.—I saw Mr. Balmer, head master of the Wesleyan School, and Dr. Reid, chairman of the Meteorological Committee of the Town Council. When I visited this station in 1891 the arrangements for thermometer exposure were not satisfactory, and the station was not then accepted. Now a fresh site, in a garden, has been obtained for the thermometers and rain-gauge, and an improvement will be made in the arrangements for the sunshine record. Mr. Balmer has zeal but as yet little experience. I think that the station promises well for a time. The Town Council are very anxious that it should be permanent.

(Signed) ROBERT H. SCOTT.

I append a note of the thermometer comparisons.

IRISH and WELSH INSPECTIONS, 1897.

CORRECTIONS NECESSARY FOR THERMOMETERS.

STATIONS.	Inspector's Standard.	Dry Bulb.	Wet Bulb.	Spare Thermometer.	Max. Thermometer.	Min. Thermometer.	Grass Min.	REMARKS.
Malin Head ..	53·6	−0·5	−0·4	−1·0	−0·6	−0·3	—	
Londonderry ..	55·1	−0·2	−0·1	—	−0·9	+0·2	—	
Markree Castle ..	56·5	−0·4	−0·3	—	−0·7	+0·3	—	
Belmullet	54·2	−0·6	−0·7	—	−0·6	+0·8	—	
Donaghadee ..	67·6	−0·5	−0·5	—	−0·2	−0·4	−0·4	
Lissan	57·8	−0·4	−0·4	—	−0·2	+0·6	—	
Parsonstown ..	56·8	−0·5	0·0	—	−0·2	0·0	—	
Glasnevin	57·0	−0·3	−0·2	−0·4	−0·0	+0·4	+0·2	
Valencia (Cahirciveen).	55·1	−0·9	−0·9	—	−0·8	+0·1	—	
Foynes	—	—	—	—	−0·2	+0·5	—	
Kilkenny	—	—	—	—	−0·1	0·0	—	
Roches Point ..	54·0	−0·8	−0·8	—	Broken	0·0	−0·7	
St. Ann's Head ..	54·0	−0·4	0·0	−0·2	0·0	−0·1	—	
Tenby	54·2	−0·6	−0·6	—	−0·3	0·0	+1·2	
Llandovery ..	46·2	−1·0	+1·0	—	0·0	+0·2	—	Instruments to be all changed.

Report of Inspection of Scottish Stations for the Year 1897.

Barometers.

The barometers at all the stations were compared with inspector's standard barometer, No. 690, which was in good order throughout the inspection. The station barometers were found to be correct and in good order. Table I. gives the comparisons with No. 690, the readings of the station barometers not being corrected, except for differences of the readings of the attached thermometers.

Table I.

Stations.	Inspector's Standard No. 690 corrected.	Reporting Barometer uncorrected	Check Barometer uncorrected.	Remarks.
	Inches.	Inches.	Inches.	
Ochtertyre	29·719	29·707	—	
Edinburgh	29·855	29·876	—	
Glencarron	29·442	29·442	—	
Stornoway	29·688	29·690	—	
Lairg	29·216	29·210	—	
Wick	29·548	29·550	29·600	Spare barometer in shop; St. B. 29·603.
Dunrobin	29·203	29·202	—	
Nairn	29·584	29·585	29·574	
Gordon Castle	29·540	29·575	—	
Aberdeen	29·838	29·842	29·838	
Braemar	28·555	28·582	—	
Lednathie	28·948	28·952	—	
Dundee	29·522	29·520	—	
Leith	29·397	29·395	29·396	
Pinmore	30·140	30·140	—	
Ardrossan	30·384	30·384	—	
Glasgow Observatory	29·787	29·790	—	

Thermometers.

The thermometers were, as in previous years, read twice, first by the observer as they hung in the thermometer screen, and then by the inspector after they had been in water along with the standard thermometer for the times specified in the table. Special attention was given to the action of the maximum thermometers; and also to the state of the minimum thermometers. As regards the latter, about a degree of the spirit was lodged near the top of the tube of the thermometers at Nairn and Gordon Castle. These were rectified.

Table II.

Stations.	Inspector's Standard Thermometer, No. 4433.	Dry Bulb.	Wet Bulb.	Max. Thermometer.	Min. Thermometer.	Spare Thermometer.	Time in Water, in Minutes.	Change of Temperature.	Remarks.
Ochtertyre ..	60·6	0·0	−0·1	0·0	−0·1	—	120	Uniform	B. B. Min. −0·1
Edinburgh ..	60·5	+0·2	+0·1	0·0	−0·2	—	90	+0·3	„ 0·0
Glencarron ..	56·9	+0·1	+0·1	+0·1	+0·1	—	90	+0·3	
Stornoway ..	60·8	+0·7	+0·6	−0·2	0·0	—	135	+0·2	
Lairg	57·2	+0·1	0·0	−0·1	+0·1	—	105	+0·3	
Wick	60·8	+0·4	+0·4	0·0	−0·1	—	85	Uniform	
Dunrobin ..	63·7	+0·1	+0·1	+0·2	+0·1	—	135	+0·5	
Nairn	59·9	+0·8	+0·9	+0·2	0·0	+0·2	75	Uniform	
Gordon Castle..	58·1	0·0	−0·1	0·0	+0·1	+0·5	110	+0·4	
Aberdeen ..	60·0	+0·1	+0·1	+0·1	+0·1	—	90	Uniform	
Braemar ..	56·0	+0·4	+0·5	−0·1	−0·3	—	110	+0·2	
Lednathie ..	58·6	+0·3	+0·2	+0·2	−0·4	—	135	+0·4	
Dundee	60·3	−0·6	−0·5	+1·4	−0·2	—	70	+0·2	
Leith	61·2	+0·1	+0·2	−0·2	−0·4	—	70	Uniform	
Pinmore ..	51·5	+0·1	+0·0	−0·1	0·0	—	65	„	
Ardrossan ..	52·7	+0·3	+0·4	+0·1	−0·1	—	105	„	
Glasgow Obser.	52·6	—	—	0·0	0·0	—	95	+0·2	

Hygrometers.

Particular attention was given to the readings of the dry and wet bulb thermometers, as they hung in the thermometer screen, immediately when the screen was opened, with the result that at all the stations these thermometers were found in good order for hygrometrical observations.

Notes of Inspections of the Stations.

Edinburgh, July 1st, 1897.—Everything at this station continues in admirable order, and the observations are thoroughly well attended to.

Ochtertyre, July 28th.—The instruments were in excellent condition, and the observations leave nothing to be desired. Underground temperatures at depths of 3, 12, 22, 36, and 48 inches will, in future, be added to the monthly schedule of observations.

Glencarron, August 12th.—Everything was in particularly good order, and the observations are made with punctuality and accuracy.

Stornoway, August 13th.—Except the barometer, which has been removed to Mr. Mackenzie's house, the instruments are in the same positions they were in at the previous inspection. They were all in excellent order, and the observations, in the absence of Mr. Mackenzie, who was in Edinburgh at the time of inspection, were made correctly by Mrs. Mackenzie and the assistant clerk. The faults in the curves of the barograph were inquired into and it was stated that they have

occurred only since using the thinner paper supplied some time ago. Special care will be given in future in fitting the papers to the drum.

Lairg, August 16th.—The instruments are remarkably well kept, and the observations are made with intelligence and scrupulous fidelity.

Wick, August 16th.—The instruments are kept in excellent order, and much intelligence is manifested in making the observations. Mr. Sinclair had a slight shock of paralysis some time ago, which probably accounted for some of the readings at the time.

Dunrobin, August 17th.—The instruments were in good order, and the observations continue to be made with much intelligence. The index of the maximum thermometer (a Phillips'), being too long, is to be altered, and in the meantime another maximum, which is correct, will be used.

Nairn, August 18th.—Four new posts were ordered for the thermometer screen. A new bottom was soldered to the receiver of the rain-gauge in June. About a degree of spirit was found lodged near the top of the tube of the minimum thermometer, which was rectified by Miss Penny at the time of inspection.

Otherwise the instruments were in excellent order, and the work of the station well attended to. I removed the reporting barometer from the lobby to the dining room of the house, with a view of securing for the instrument and its attached thermometer a more equable temperature.

Gordon Castle, August 19th.—About a degree of spirit was lodged near the top of the tube of the minimum thermometer, which Mr. Webster, under my direction, rectified at the time of the inspection.

The instruments were in good order, and the observations carefully and correctly made.

Aberdeen, August 25th.—The instruments continue to be kept in excellent order and the observations made with care and exactness.

As requested, I made inquiry as to the occasional late arrivals of the Daily Weather Telegrams at the Meteorological Office. Several causes were assigned for these delays, but after some conversation with Mr. Spenceley and Mr. Shepherd of the Aberdeen General Post Office, it is expected that delays in the despatch of the telegrams from Aberdeen will not recur.

Braemar, August 24th.—The instruments are in very good order and much care and intelligence are manifested in making the observations.

Lednathie, August 26th.—The instruments at this station continue to be well kept and much care is given to secure accuracy and punctuality in making the observations. The anemometer is in excellent order, and is well placed so as to give a close approximation to the velocity of the wind in the Lednathie Valley.

Dundee, August 27th.—All the instruments are in very good order and the observations carefully and correctly made. A slight change was ordered for the purpose of giving a better exposure to the two bulbs of the hygrometer.

Leith, August 30th.—The instruments are all in very good order, and the observations well attended to by the three observers.

A new position which has been proposed for the instruments was inspected, and further action will be taken in November to carry out the much needed change from the present position.

Ardrossan, October 6th.—Repainting, a new ventilator, and the repair of a few laths of the thermometer screen are required. The instruments were otherwise in very good order and the observer is very conscientious. Extensive additions were being made to the building of the post office, during which the barometer had been removed to a temporary position. The removal had been made with great care.

Pinmore, October 7th.—The instruments were all in remarkably good order, and the observations continue to be made with intelligence and enthusiasm.

Glasgow Observatory, October 8th.—Everything here was found to be in excellent order and the observations are made with the greatest care and skill.

(Signed) ALEXANDER BUCHAN,
Inspector of Scottish Stations.

REPORT OF INSPECTIONS, 1897.

R. H. Scott, Esq., M.A.,
Secretary, Meteorological Council.

SIR,

I BEG to hand you the following Report of Inspections of several English stations carried out by me at various times during the year 1897.

Hollesley Bay.—Colonial College.—Visited on July 30th.—The objects of this visit were (1) to take the instruments down to the station and to explain the method of dealing with them; (2) to select a position for the exposure of the out-door instruments; and (3) to see that the position of the barometer should be as satisfactory as possible.

All these points were arranged, and I had reason to be greatly pleased with the zeal and readiness shown both by the manager, and the science master (Mr. Pile), in their efforts to make the station a really good one. The instruments arrived safely, the position for the thermometers and rain-gauge is an excellent one, quite away from the influence of buildings or high trees, and a brick tower is to be built for the sunshine recorder, so that its exposure may be perfect. I spent several hours in giving instructions, and pointing out all the little errors which may easily occur in taking and reducing the readings. I regret that Mr. Pile is about to leave the college, and that I could not see his successor, as he had not then been appointed.

North Foreland.—I visited this (telegraphic reporting) station on two occasions—viz., on September 7th and 14th. The instruments were in fairly good condition, but the indications of the dry and wet bulb thermometers were higher than they should be, and the scale of the maximum thermometer was broken. The door of the thermometer screen was broken and off its hinges. On the 14th I took a

new maximum thermometer to the station, and found that the screen had been thoroughly repaired and painted in accordance with the instructions given on the 7th.

The observer (Mr. Jenkins, junior) is really too young for such responsible work, and were it not that the assistant observer (Coast-guardsman A. Heighton) is a very competent man, I should advise that some steps be taken to get a better observer. As it is, however, things work fairly well.

St. Leonards.—Visited on September 9th and 11th, there was constant heavy rain till noon 9th.—The barometer read too low, and the dry and wet bulb thermometers much too high when compared with the standard I had with me, and also with a Kew standard belonging to Mr. Colborne. The wet-bulb needed some repairs to its scale, and these were done. The sunshine recorder I shifted to a new position on a tower built for the purpose by the town council and affording an excellent exposure all round. It was in order to make the final adjustments in this new position that I visited the station a second time on September 11th. Observations on the Marina are now being made by a careful observer.

Dungeness.—Visited on September 10th.—Instruments all in excellent order and observations well made. The new arrangement for sending the observations to London over the Admiralty wire is working very satisfactorily.

Eastbourne (Second Order Station).—Inspected on September 13th. —Instruments in this station all in good order excepting the barometer. This has been shifted to another room, but the altitude above sea was not changed. The rack and pinion, to the vernier, were again defective, and I asked observer to get them put right. The thermometers are very good instruments. Sunshine lens was *slightly* out of adjustment, but observer undertook to put it right in a few days, when a new (crown glass) lens was expected.

Cuckfield (Rainfall Station).—Inspected on September 14th. The rain-gauge was in good order, and had been properly placed in the new position selected by Mr. J. Curtis a year ago.

Rochester (*Rede Court*), Second Order Station.—Primary Inspection. —Inspected September 15th. This is a most satisfactory station. The instruments are good, their exposure is good, and the observations are made with accuracy by Mr. W. H. Tingey, B.A.

Chatham (Second Order Station).—School of Engineering, Royal Engineers.—Inspected on September 16th. Quarter-master Sergeant McCudden in charge. Instruments as a whole, and exposure, very good, but barometer is still in a defective position, owing to want of light; solar radiation thermometer indicates too high. Wind force is not good, owing to its being obtained from a small anemometer which is not well placed.

Epsom, Royal Medical College.—Inspected on November 17th.—A station (Second Order) with a very good equipment of instruments, all of them very well exposed. The observations, however, were being

made in a very unsatisfactory manner and cannot be relied on for any purpose. I failed to obtain any promise of improvement.*

Bramley.—Inspected on November 18th.—The instruments at this station are good and are well exposed, excepting the important fact that the thermometer screen is not a "Stevenson," though resembling it in outward appearance. It is only a single-louvred screen, of home make, and the effect of this on maximum and minimum temperatures in clear bright weather is most serious. The position of the station between two ranges of hills makes it certain that the wind direction is often purely local. Observer could not promise any change as the instruments are only on loan. The wet-bulb was in very good order, all the instruments were clean, and the observer was very desirous of doing good work.

Meteorological Office, 28th March, 1898.

(Signed) FREDC. GASTER.

October 12, 1897.

SIR,

I HAVE the honour to submit herewith the following reports upon the inspection of the stations visited by me this year.

I am, &c.

(Signed) R. H. CURTIS.

R. H. Scott, Esq., F.R.S.

SUNSHINE STATIONS.

Colwyn Bay, visited August 28th.—The exposure of the sunshine recorder at this station leaves a good deal to be desired, but at present it does not appear to be possible to obtain a better site. Dr. Lord told me that his tenure of the field where the instrument now stands is uncertain, and that if a better site becomes available he will endeavour to secure it.

Llandudno, August 28th.—I visited the proposed site for the sunshine recorder at the Infectious Diseases Hospital, but did not consider it the best to be obtained, and eventually a much better position for it was found close to where it formerly stood. The erection of the instrument will be proceeded with at once.

Southport, September 8th.—The instruments here are very well exposed and are most carefuly attended to. I tested the instrument and found its adjustments were all satisfactory.

Blackpool, September 9th.—The management of this instrument has for a long time been very unsatisfactory. Unfortunately Dr. Anderson was away from home, but I pointed out to the lad who attends to the recorder the points which required improvement, and Dr. Anderson has since promised that they shall be attended to. I found the adjustment of the instrument faulty, and before leaving set it correctly.

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*Since then a promise of improvement has been made by the observer.

Second Order Stations.

Chester, September 6th.—The instruments were all in good order and carefully read, but the site is a small one, and the instruments are necessarily a good deal crowded. The sunshine recorder is especially affected by trees, and by a large building close at hand.

St. Helen's, September 8th.—The present observer, Dr. Harris, has only recently succeeded to the work, but he has taken it up enthusiastically, and is endeavouring to add a sunshine recorder, and an anemometer, to the present stock of instruments. The position of the station is most satisfactory, and the readings are very carefully taken.

Heysham, September 10th.—Everything at this station was in excellent order and much care is bestowed upon the observations. The observer now sets and reads his barometer very correctly.

Gilcrux, September 11th.—The grass minimum at this station had an unusually large amount of spirit at the top of the tube, and the error had not been detected; in every other respect the instruments were in good order, and they are very carefully read. The practice of removing the sunshine recorder indoors each evening is not a satisfactory one, but the observer says it would be unsafe to leave it out all night.

Marton (Skipton), September 14th.—The instruments here were all in very good order and the observations are carefully made. I spoke about the desirability of getting 9 p.m. observations taken, but at present it is not easy to overcome the difficulties in the way.

Manchester, September 15th and 16th.—The sunshine recorder at this station was entirely out of adjustment, and apparently the observer, Mr. Hazzlewood, has for a long time past failed to obtain observations of any value. Dr. Niven was away from home, but he has since promised to have the instrument readjusted. In every other respect the station was in good order and the instruments were accurately read.

Prestwich, September 15th.—The situation of all the instruments here is excellent, and they are very carefully attended to and accurately read. The observer had misunderstood the instructions as to the entry of preceding weather, but this will be set right in future.

Telegraphic Reporting Stations.

Holyhead, September 3rd and 4th.—The instruments were correctly read and the observer is careful in making his observations. The position of the rain-gauge is unsatisfactory.

Bidston, September 7th.—The thermometer screen had been removed to a very good position to the north of the observatory, where it cannot be affected by radiation from the walls of the building, as may possibly have been the case before. Everything was in excellent order at this station.

Hawes Junction, September 13th.—This station has not been inspected for some time. The instruments were all in good order, and are apparently read both regularly and carefully.

Anemographic Station. *See* separate Report.

Barometers.

Stations.	Inspector's Standard corrected.	Reporting Barometer uncorrected.	Check Barometer uncorrected.	Remarks.
	Inches.	Inches.	Inches.	
Holyhead	30·020	30·024	30·020	
Chester	29·789	29·764	—	
St. Helens	29·864	29·868	—	
Heysham	30·380	30·380	—	
Gilcrux	30·250	30·238	30·244	
Hawes Junction	29·417	29·407	—	
Marton	29·955	29·956	—	
Manchester	30·215	30·204	—	
Prestwich	30·010	29·996	—	The observer set the vernier too low.

Thermometers.

Stations.	Reading of Standard.	Corrections to be applied to the Readings of the—.						Notes.
		Dry Bulb.	Wet Bulb.	Spare Therm.	Max. Therm.	Min. Therm.	Grass Therm.	
Holyhead ..	55·0	−0·5	−0·4	−0·3	−0·3	0·0	—	
Chester ..	64·1	−0·2	0·0	—	−0·3	+0·2	+0·2	
Bidston ..	57·0	0·0	−0·1	—	+0·2 −0·2	+1·0 +0·7	—	There are two max. and min. thers. here.
St. Helens ..	53·7	−0·2	−0·2	—	−0·1	+0·3	+0·7	
Heysham ..	57·0	−0·4	−0·6	—	−0·6	−0·2	−0·3	* When first tested nearly 14 degrees of spirit were found at top of tube.
Gilcrux ..	50·0	−0·3	−0·2	−0·2	−0·3	−0·2	*−0·1	
Hawes Junction.	60·1	−0·5	−0·3	—	−0·5	0·0	—	
Marton ..	57·2	−0·4	−0·5	—	−0·3	−0·2	+0·2	
Manchester ..	61·4	−0·4	−0·4	—	+0·1	+0·1	−0·1	
Prestwich ..	62·0	−0·5	−0·6	—	0·0	−0·2	+0·1	

Meteorological Office, London, S.W.,
October 26, 1897.

Sir,

I beg to submit, herewith, my report on the recent inspection by me of certain of the English stations in connexion with the Office.

I am, &c.

(Signed) John A. Curtis.

R. H. Scott, Esq., M.A., F.R.S.

Telegraphic Reporting Stations.

Hurst Castle, September 22nd.—I found everything in good order at this station, except that the rain-gauge was loose. This the observer promised to rectify at once. I tested the observer's setting and reading of the barometer several times, and found him to be correct in each case.

Jersey, St. Aubin's, September 17th.—This station was in good order, except that the thermometer screen needed repairs, which I directed should be carried out at once. Mr. Fisher seems very careful and accurate, but his son, who occasionally takes the observations, while setting and reading the barometer quite correctly, is rather apt to be a degree or so in error with the thermometers.

Prawle Point, September 15th.—The instruments were all clean and in good order, and the observer is careful and intelligent. The thermometer screen needed some slight repairs, which I effected. The work at this station is, I think, very well done.

Stations of the Second Order.

Edgbaston, September 7th.—This is a station newly established under the auspices of the Midland Institute. The observer, Mr. A. Cresswell, struck me as being most competent and careful. The outfit and exposure of instruments are alike excellent, and the station will, I think, prove to be a very valuable one. In addition to the ordinary instruments there are in use a "King" barograph and an "Osler" self-recording rain-gauge.

Plymouth, September 14th.—Everything was in excellent order at this station, and the observations are taken with great care and intelligence. Mr. Prigg has recently got the Corporation to agree to build a computation room for the station. When this building (which will be a great convenience) is erected, the thermometer screen and rain-gauge will be removed a short distance. The exposure will then be, if anything, better than at present.

The Corporation has also sanctioned the purchase of a "Dines" anemometer, a "Beckley" self-recording rain-gauge, and a "Bailey" wind-direction recorder. I spent some time advising as to the positions of these instruments.

Rugby, September 6th.—Mr. Kitchener, the master who superintends the work, was absent at the time of my visit; but I saw Mr. Kirk, who takes most of the observations, and spent a good deal of time with him going over the details of the work. The thermometers were dirty, and I found that of late town water had been used for the wet-bulb. I cleaned the instruments and gave proper directions for the future.

The barometer is exposed to the morning sun and I think a new position should be sought for it. It was too high for the observer to read properly, and I therefore lowered it by two inches. The observer over estimated the amount of cloud. The rain-gauge is a good deal rusted and will soon want renewal.

Southampton, September 16th.—Everything was, as usual, in excellent order at this station, and the observations continue to be made with the greatest care. The deputy-observer at first set the barometer rather high, but at a second attempt set it and read it correctly.

The thermometer screen has had an addition made to it, intended to shelter the observer while reading the instruments, and as I do not think the readings will be affected by it, I decided that this might remain.

Sunshine Stations.

Cirencester, September 10th.—The instrument was in very good order. It was also in good focus and burning well at the time of my visit, and it appeared to be carefully attended to.

Guernsey, September 20th.—This is a "Jordan" photographic instrument, and is admirably exposed on the roof of Dr. Carey's house in St. Peter's Port. Dr. Carey now fixes the curves before measuring them, in accordance with the recommendation of the inspector last year. The instrument is, I think, carefully attended to.

Jersey (*St. Heliers*), September 18th.—I could detect no fault in this instrument, or in the fixing of it, while its exposure is as nearly perfect as is likely to be obtained anywhere. The gunner who has charge of the recorder is in the habit of supplying the daily duration of sunshine to the local newspapers, but he has no scale for this purpose, and, as was to be expected, in several cases where I tested his estimates I found him to be in error.

I was informed that the instrument is sometimes interfered with by soldiers of the garrison or their visitors, and I recommend that to prevent this a light iron railing be fixed around it with a gate that can be locked.

Plymouth, September 14th.—This instrument was in admirable order and very carefully attended to. The new position, see p. 55, will be about 20 yards from the present position, and about 4 feet higher. The recorder will then rest upon a brick pillar instead of, as now, on a wooden stand, and the change will be in every way an improvement.

Southampton, September 16th.—Instrument in excellent order, and very carefully attended to.

Ventnor, September 24th.—The recorder is fixed on a brick pillar in the grounds of the National Hospital for Consumption. It has been very carefully adjusted, and is exceptionally well attended to. The exposure is perfect at the winter solstice. At the equinoxes and in the summer a little sunshine will be lost in the early morning and late evening. Dr. Lewis has no glass tabulating scale.

Weekly Weather Report Stations.

Bristol (*Clifton College*), September 11th.—All was in good order at this station except the rain-gauge which was loose and not quite level. These defects I corrected.

The thermometer screen is somewhat overshadowed by a thorn tree growing near, but no better position is available. The observations are carefully attended to.

Cirencester, September 10th.—All the instruments were in excellent order at this station. The deputy observer read the maximum thermometer at first 5° in error but otherwise his readings were careful and accurate. As desired, I paid special attention to the thermometers, and found them to be good instruments, and the screen well placed. The instruments were not firmly fixed in their places, however, and while I made the dry bulb and wet bulb secure, it was promised the carpenter should at once attend to the others. The maximum and minimum at present are hung too near to the door, and it is very probable that the abnormal readings sometimes noticed are due to this cause. I think both these instruments should be set back by an inch and a half.

The rain-gauge measuring glass did not agree with that supplied to me as a standard.

Plymouth, September 14th.—All in excellent order; see report under Stations of the Second Order.

Shirley, September 8th.—The maximum thermometer had recently been broken, and had been sent to Birmingham for repair, the instrument maker meanwhile lending another maximum for use. This latter is a Kew verified instrument, and it agreed with my standard.

The rain-gauge has been removed from the enclosure in which it was formerly placed and now stands in the open field, very well exposed, but liable to be interfered with by the poultry and cattle. I recommend that Mr. Boothroyd be asked to place a suitable guard around the gauge.

Stations of the Third Order.

Campden, Gloucestershire, September 9th.—This is a new rainfall station, never before inspected. The observer, Captain Wright, R.A., was from home at the time of my visit, but he had arranged with Mr. Walter Tucker, the deputy observer, to meet me and give me every information. I found the gauge exposed in a kitchen garden, on sloping ground, and much sheltered by trees and shrubs. Captain Wright had left instructions that if I was dissatisfied with the present position, the gauge should be removed to any other I might select. Accordingly I chose a position on the lawn at the back of the house, and had the instrument carefully levelled and fixed there. The exposure is now very good.

Plymouth (*Freedom Park*), September 14th.—This is a rain-gauge station on the high ground at the back of the town; perhaps two miles from The Hoe. I found the gauge in good order, and carefully attended to. The arrears, it was promised, should shortly be cleared off.

Totland Bay (*Isle of Wight*), September 23rd.—Unfortunately the observer, Mr. John Dover, B.A., was from home on the day of my visit.

I found the instruments in good order, but that the rain-gauge had been removed during the last two months to a position nearer the edge of the lawn, where it would certainly be sheltered by the trees. I replaced it in its old position which is decidedly better.

I was not able to learn anything as to the probability or otherwise of getting 9 p.m. observations in the future, thus bringing the station up to the Second Order.

I append the usual tables showing the results of the comparison of the instruments at the various stations.

Barometers.

Results of Comparisons with the Inspector's Standard, Adie B.T. No. 71.

Stations.	Inspector's Standard corrected.	Reporting Barometer uncorrected.	Check Barometer uncorrected.	Remarks.
	Telegraphic Reporting Stations.			
	in.	in.	in.	
Hurst Castle	29·925	29·904	29·904	
Jersey (St. Aubin's) ..	29·905	29·907	29·902	
Prawle Point	30·060	30·052	30·054	
Second Order, and Weekly Weather Report Stations.				
Bristol (Clifton College)	30·202	30·220	—	
Cirencester	29·928	29·928	—	
Edgbaston	29·480	29·488	—	
Plymouth	30·416	30·418	—	
Rugby	29·435	29·428	—	
Southampton	30·020	30·020	—	
Totland Bay	29·820	29·783	—	

Thermometers.

Results of Comparisons with the Inspector's Standard No. 5477.

Standard corrected. No. 5477.	Stations.	Correction to be applied to the readings of						Remarks.
		Dry Bulb.	Wet Bulb.	Maximum.	Minimum.	Grass.	Spare.	
	Telegraphic Reporting Stations.							
		°	°	°	°	°	°	
56·9	Hurst Castle ..	−0·6	−0·1	−0·4	−0·2	—		
62·9	Jersey (St. Aubin's)	−1·0	−1·1	−0·6	−0·1	—	−0·2	
60·6	Prawle Point ..	−0·5	−0·2	−0·2	−0·4	—	−0·8	
	Second Order, and Weekly Weather Report Stations.							
54·2	Bristol (Clifton College).	−0·7	−0·6	−0·6	−0·4	−0·8	—	
56·9	Cirencester ..	−0·1	−0·1	−0·3	−0·2	−0·1	—	
58·0	Edgbaston (Birmingham).	−1·0	−1·0	−0·2	0·0	+2·1	—	
63·1	Plymouth ..	−0·1	+0·1	0·0	+0·3	+0·3	—	Earth therm. No. 5481+0·6.
58·3	Rugby	−0·4	−0·3	−0·6	+0·1	+0·1	—	
53·7	Shirley	−0·1	+0·1	−0·1	+0·2	—	+0·6	
62·9	Southampton ..	−0·4	−0·4	−1·1	−0·1	−0·1	—	
62·8	Totland Bay ..	−0·1	+0·3	−0·1	+0·4	—	—	

INSPECTION OF STATIONS—1897.

SIR,

I BEG to submit report of my inspection this year of various stations in the north and north-east of England.

I am, &c.

(Signed) FREDK. J. BRODIE.

R. H. Scott, Esq., M.A., &c., &c.

TELEGRAPHIC REPORTING STATIONS.

York, September 23rd.—The instruments were in very fair condition, but the dry-bulb thermometer, stolen from the screen last winter, had not been replaced by a new one, and readings were taken from the dry bulb thermometer used for the 9 a.m. readings. The repainting of the screen, ordered last year, had not been carried out. The screen was extremely dirty, and I requested Mr. Platnauer to have it seen to at once.

Spurn Head, September 22nd.—Since last year, the rain-gauge has been raised on a substantial wooden pedestal to a height of about 3 feet; the difficulty hitherto arising from the drifting of sand into the gauge has thus been almost entirely overcome. All the instruments were in excellent condition, but the woooden railings surrounding the screen and rain-gauge were greatly in need of repair. The wet-bulb thermometer read nearly a degree higher than the dry. I instructed the observer to deduct, provisionally, one degree from all wet-bulb readings.

2. SECOND ORDER STATIONS.

Morpeth, September 27th.—This is quite a new station, and none of the instruments were in position. I endeavoured to get the services of a carpenter for this purpose, but learnt that it would be impossible for him to attend within at least four days of my visit. Beyond fixing the barometer and inspecting the proposed site for the screen and rain-gauge, I could do very little, but before leaving, I gave observer careful and detailed instructions with regard to the placing of the various instruments. The station is on a large plateau, more than 300 feet above mean sea level, and the outdoor instruments are to be fixed in a railed enclosure in an open field, the nearest obstruction being a belt of trees about 60 yards to the north-eastward. The future observer, Mr. G. P. Berry, has already had considerable experience in observing at some of the stations of the Scottish Meteorological Society. He appeared to understand fully the requirements of the various instruments as regards exposure. The station promises to be a very valuable one.

Newcastle-on-Tyne, September 25th.—This is essentially a town station, and the outdoor instruments are set up on a concrete roof. It is, however, proposed shortly to start a small grass plot for a terrestrial radiation thermometer, and I advised that if possible the plot should be made of sufficient size to enable the thermometer screen to be set over it. The surrounding atmosphere is smoky, and at the time of my visit the thermometers were somewhat dirty. In view of the locality the observer was requested to change the muslin of the wet-bulb

more frequently. Owing to the closing of the works it is impossible to take evening observations later than 6 p.m. on ordinary week-days, and 2.30 p.m. on Saturdays; on Sundays they are not made at all. The sunshine recorder was firmly fixed and accurately adjusted.

Barnard Castle (North-Eastern County School), September 28th.—This is at present only a projected station, no instruments having yet been procured. The headmaster of the school (the Rev. F. L. Brereton) appeared very desirous of starting as soon as he could obtain sanction for the necessary expenditure. The school stands on high ground, and the position is very open. I selected a good site for the rain-gauge and thermometer screen, and supplied a rough estimate as to the cost of the outfit necessary for a second order station. Mr. Brereton appears to take much interest in meteorological work.

York, September 23rd.—A new thermometer screen was erected last January, the double set of instruments used for telegraphic and second order observations having been hitherto crowded together in the old one. The screen is in an excellent position, and the instruments were clean and in good order. The acting observer (Mr. J. Wright) is, however, somewhat careless. I requested him to give fuller remarks as to the general character of the weather each day, and also of any exceptional phenomena. Mr. J. Erskine Clark, formerly in connexion with the Friend's School, had left the sunshine recorder temporarily in care of one of the boys. The headmaster trusted that Mr. Clark's successor, the new science master, who had only just been appointed, would be induced to take charge of the instrument.

Tealby, September 21st.—The instruments were in good order, but the screen and rain-gauge were both somewhat insecurely fixed. Observer's attention was drawn to this, and also to the necessity for sending in his returns with greater regularity. Instructions were given as to the management of the wet-bulb in frosty weather—a point hitherto neglected at this station.

Fulbeck, September 30th.—The instruments here were in excellent condition, but some rather serious errors were detected, both in the methods of observing and in the manner of filling up the returns. These will, I think, be remedied in future. The thermometer screen is at present somewhat close to the house, and it was suggested that it be removed to a more open situation near the edge of the lawn.

Belvoir Castle, October 1st.—The screen in use here is a Glaisher's, and is fixed over bare garden soil. I suggested strongly the advisability of getting a Stevenson screen, the observer promising to bring the matter to the notice of the Duke of Rutland on his return from the Continent. The instruments were all in good order, and the observer, Mr. Divers, seemed careful and intelligent. He has no time to work out the observations in any great detail.

3. Stations of the Third Order.

Bawtry (*Hesley Hall*).—There was nothing here worthy of special note but the mounting of the wet-bulb was not quite satisfactory. Mr. Whitaker expressed some intention of purchasing a Campbell-Stokes sunshine recorder.

Market Rasen.—This is a rainfall station only. Observer had run out of forms, and had not sent in any returns for three years. He cannot undertake to supply arrears beyond the commencement of the present year, as his previous records have not been kept.

Appended are tables showing the results of the comparisons of barometers and thermometers.

Barometer Comparisons, 1897.

Stations.	Inspector's Standard corrected. (M.O. 386.)	Reporting Barometer uncorrected.	Check Barometer uncorrected.	Reporting Barometer. Correction required to reduce to Inspector's Standard.	Remarks.
	ins.	ins.	ins.	ins.	
York	29·570	29·564	—	+·006	There is no check barometer at this station.
Spurn Head ..	29·737	29·732	29·726	+·005	
Morpeth ..	29·950	29·950	—	·000	
Newcastle-on-Tyne.	30·004	29·990	—	+·014	Reporting barometer is a Fortin.
Tealby	29·411	29·408	—	+·003	
Fulbeck	29·665	29·662	—	+·003	
Belvoir Castle ..	29·857	29 828	—	+·029	

Thermometer Comparisons.

Stations.	Standard corrected. No. 5475.	Corrections to be applied to the readings of :— Dry Bulb.	Wet Bulb.	Spare Ther.	Max.	Min.	Grass Min.	Remarks.
York	56·1	—	−0·6	—	−0·4	+0·6	—	Tel. reporting instruments.
	56 1	−0·8	−0·6	—	−0 7	−0·4	—	
Spurn Head ..	58·0	−0·1	−0·9	−1·0	−0·2	0·0	—	
Morpeth ..	54·0	+0·1	0·0	—	+0·1	+0·8	−0·5	
Newcastle-on-Tyne.	57·0	0·0	0·0	—	0·0	0·0	—	
Tealby ..	55·0	−0·2	−0·2	−0·1	−1·2	0·0	—	
Fulbeck ..	58·9	+0·1	−0·1	—	−0·1	+0·8	—	
Belvoir Castle	55·0	−0·1	−0·3	—	−0·1	−0·2	−0·2	
Bawtry ..	61·0	−0·1	−0·2	—	−0·2	0·0	—	

Reports on Observatories.

Kew Observatory, November 9, 1897.

Dear Sir,

I beg to forward herewith my report and inspection notes regarding the self-recording instruments at the observatories, anemograph stations, &c. inspected on the following dates:—

Scilly (*St. Mary's*), September 22nd-24th.—At this station the instruments were in good order and appear to be carefully attended to.

On dismounting the Robinson anemometer I found the sperm oil in the bearings in a satisfactory condition, all parts, however, were cleaned and fresh sperm oil applied. As the clock had only been cleaned a week or two prior to my visit I did not take it to pieces, and merely oiled the pivots and escapement.

The orientation was duly tested and found accurate; and Mr. Hicks was instructed to send to the Meteorological Office an orientation paper once a month.

The Dines' anemometer was working well, excepting that the gearing wheel at the bottom of the clock spindle was found to be slightly loose, which would reasonably account for any differences previously shown between the curve and clock times. I corrected this by pinching up the collar, but it would be an improvement and safeguard for future instruments to have the wheel secured to the spindle by a pin instead of being held on by a friction collar only.

The water in the main reservoir was quite clear, and in consequence I merely added a small quantity of water in order to bring the level up to the mark on the glass tube, after which the pen was adjusted to the zero line.

The thermometers were all tested, and the sunshine recorder found to be in accurate adjustment.

Falmouth, 27th-30th.—Here all the instruments were in good working order.

Both the barograph and thermograph clocks were cleaned, and the lenses and fittings duly attended to. The thermograph clock needed a new cord, and a small weight was fitted to the lever to improve the action of the light shutter.

The various thermometers were compared by means of Kew Standard No. 720, and found to have the following corrections:—

					°
Dry standard, 383	...	...	...	...	−0·5
Wet „ 738	...	...	...	...	0·0
Maximum, M.O. 104	...	...	..	...	−0·5
Minimum, M.O. 308	...	...	...	...	0·0
Barograph thermometer (no number)...			...	...	−0·9
Standard barometer, attached thermometer (no number)					−0·8

On dismounting the anemometer the oil in the direction well was found quite limpid. I had all parts cleaned, and supplied the bearings with fresh asbestos lubricant.

The clock and recording parts were also examined and the orientation tested and found correct.

The self-recording rain-gauge was working quite satisfactorily, but the spare gauge I found slightly out of level and the funnel not quite circular. These defects were put right and "squeezes" obtained of both funnels. As regards the sun recorder, this instrument was found to be in accurate adjustment.

Phœnix Park, Dublin, October 4th-5th.—The anemograph here was going well, and the clock did not require special attention, having, shortly before my visit, been cleaned by a local optician.

The new silver pencils fitted to the instrument at the beginning of the year appear to mark the sheets very satisfactorily. The external parts of the anemometer were dismounted, and I found that all the

bearings were well lubricated. After cleaning, fresh sperm oil was added, and the orientation tested as usual.

The observer was instructed to send an orientation paper once a month to the Meteorological Office.

The examination of the sunshine recorder was carried out.

Valencia, October 7th-9th.—The instruments at this observatory were all in good order, and the photography was excellent at the time of my visit, the traces being quite uniform in intensity throughout the 24 hours. Mr. Cullum attributes this improvement to the use of a new brand of lamp oil, which gives a much steadier and more equable light than was the case with the oil previously in use. I dismounted the thermograph, cleaned the lenses and clock, and attached a new winding cord to the barrel.

The barograph was also examined, and a small weight fitted to the lever of the light shutter to endeavour to improve its action, which at times is a little uncertain.

The zero dots of the thermograph were changed from the summer to the winter position, and the various thermometers compared in water with the Kew Standard No. 720 at 55° Fahr., and their corrections found as follows:—

	°
Dry standard, 399	−0·7
Wet „ 473	−0·3
Maximum M.O. 1003	0·0
Minimum, M.O. 2497	+0·2
Barograph thermometer (no number)	−1·9
Attached thermometer to the standard barometer, 71,062	0·0

All parts of the anemometer were found to be well lubricated, and the asbestos oil in the direction well was in such excellent condition that I determined to let it remain for another year.

Armagh, October 13th-14th.—The anemometer at this observatory was in excellent order and is well attended to. I entirely dismounted the instrument and found the oil in the direction well quite good, though discoloured. After cleaning, fresh asbestos oil was applied to the various bearings.

The clock was taken to pieces and cleaned, and a new line attached to the weight. After starting the instrument the orientation was examined and found correct. The rain-gauge was also generally cleaned, and "squeezes" were taken of both the self-recording and spare funnels. I found the sun recorder in accurate adjustment.

Fleetwood, October 15th-16th.—Although the weather was boisterous and rainy on the first day of my visit, I managed, with the aid of Mr. Gaulter's men, to dismount the outside portions of the anemometer.

The fans, cup-arms, and stays were in a satisfactory state, but one of the cups was dented by a stone which had been thrown at it; this I had put right.

The bearings were all well lubricated, and the oil in the direction well was fairly limpid, though a good deal of brownish sediment was at the bottom of the well. I cleaned this out, and replenished all parts with fresh sperm oil. When examining the clock, and cleaning the recording

apparatus, it was noticed that the clamp of the velocity shafting was not very tightly screwed up, and it is just possible that this may account for the irregularity shown on one of the sheets prior to my visit, but Mr. Gaulter was unable to show me the actual record as it had already been sent in to the Meteorological Office. After re-mounting the instrument, the orientation was examined and found correct. Before leaving I drew the attention of the observer to the non-agreement of the times entered on the sheets as compared with the time shown by the curves; Mr. Gaulter promised to have this attended to more closely.

Stonyhurst, October 18th-19th.—The barograph and the thermograph were examined and found in good order. I oiled the clocks and generally cleaned the other parts of the instruments, after which the zero lines of the thermograph were changed to the winter position. With regard to the irregularity in the intensity of the photographic curves the observer informed me that this was due to a defective flow of gas. For a long time past a good deal of trouble has been experienced, owing to alterations at the gas works, but it is hoped that this difficulty has now been in a great measure overcome. The thermometers were compared at 55° Fahr., by means of Kew Standard 720, and the following corrections determined:—

	°
Dry standard, 619	−0·1
Wet „ 382	−0·4
Maximum, M.O. 1525	0·0
Minimum, B.T. 501	+0·3
Grass minimum, 81,514	+0·3
Attached thermometer to the Standard Barometer, No. 696	−0·8
Barograph thermometer, 339	−0·5

Note.—The correction employed at Stonyhurst to the attached thermometer of the standard barometer is +1°·3, which is half a degree higher than the correction found above.

The weather being favourable at the time of my visit, I was enabled to take down entirely the external portions of the anemometer and thoroughly clean all the parts. The oil in the direction well was in fairly good condition. This was sperm oil obtained locally with a little paraffin added; this, however, was removed and the various bearings replenished with the asbestos oil which had been sent from Kew. The orientation was duly tested and found correct.

With regard to the rain-gauge, this instrument was going well, and "squeezes" of both the self-recording and spare funnels were taken and are sent in with this report.

The sunshine recorder I found in accurate adjustment.

Telegraphic Reporting Station.

Scilly, September 23rd-24th.—At this station all the instruments were found in good order, and appear to be carefully attended to. I particularly drew the observer's attention to the very great importance,

when making up the weather telegrams, of including the extreme barometer reading as shown by the self-recording aneroid.

Mr. Hicks and I agreed very well in reading off the barometer and thermometers.

Second Order Stations.

Phœnix Park, Dublin, October 4th-5th.—The observer at this station has been changed, and Corporal Blackmore now takes the observations. He seems very anxious to do the work well, and showed great interest in the cleaning of the anemometer.

The thermometers were all in good order, but the screen was in a very shaky condition, the supports being quite rotten in the ground, and the screen itself coming to pieces. This I reported to the Office.

When testing the thermometers I regret to say that I had the misfortune to break the grass minimum. Corporal Blackmore reads the thermometers correctly, but his barometer readings are somewhat lower than mine.

Armagh, October 13th.—I found that all the instruments here were in excellent order.

Stonyhurst, October 19th.—All the instruments at this observatory were, as usual, in good order.

Falmouth, September 27th.—Here the thermometers, &c. were all in good order, excepting that the spare rain-gauge was found to be slightly out of level, and the funnel not quite circular. These small defects were put right, and the gauge more securely fixed.

(Signed) T. W. Baker.

R. H. Scott, Esq., F.R.S.

Kew Observatory (Old Deer Park), Richmond Surrey,
November 16, 1897.

Sir,

I have the honour to forward you herewith my notes on the inspection of various stations this year, and particulars of the comparison of the Kew and Oxford (Radcliffe) standard barometers.

Yours, &c.

(Signed) E. G. Constable.

R. H. Scott, Esq., F.R.S., &c.

Observatories and Anemograph Stations.

Aberdeen, August 6th-9th.—*Anemograph.*—This instrument was in good order, and its lubrication well looked after.

It was dismounted and thoroughly cleaned.

The old sperm oil (procured locally) was fluid, but very discoloured; it was removed and replaced by the sperm oil recently supplied by the Office.

The cups, spindle, and fans are in good condition, but the stays to the cup-arms are corroded and becoming thin in places.

The clock was taken down and cleaned, and I found that the gut line, which has been in use for many years, was perishing and becoming much worn. I removed it from the barrel, but had rather a difficulty in fitting new gut, owing to the very small size of the barrel eyes, so the clock was not restarted till 8 p.m. It stopped later on, and examination showed that the ratchet spring had worked up a little; this was rectified, and it is now going well.

The orientation was tested both before and after dismounting instrument, and was good in both instances, and the markings will be found on anemograph curve No. 220.

Barograph.—This was in good condition.

Clock was cleaned and oiled, lenses and condenser were polished, and slit removed from tube and latter cleaned.

Thermograph.—Owing to the difference in the scale values of the dry and wet thermometers there is overlapping and confusion of traces at very low temperatures.

I endeavoured to rectify this by altering the "wet" thermometer, but the screws holding the arm-plates together had become so fixed, through burring or corrosion, that it was found impossible to move them by any ordinary means, and indeed any effort to do so was attended with considerable risk of breaking the tube.

The difficulty was overcome by altering the clamping pieces of the dry thermograph tube and carefully shifting the tube little by little in its frame, and by this means I was able to alter the distance sufficiently to give an additional five degrees between the two zero lines, and this should prevent any considerable merging of the traces in future.

The clock, lenses, and mirrors received the customary attention.

Rain-gauge.—This was performing satisfactorily. The clock, &c. was cleaned and left in good order. The enamelled surface of the receiver is becoming badly damaged by frost and exposure, leaving bare large patches, and it is quite gone round the rim.

Since I was last here, the ash tree mentioned in my report for 1895 has grown rapidly, and some of the branches are now only about six feet distant.

Another "Richard" pen, with holder, is wanted at this station.

The thermometers were compared with the Kew Standard Thermometer No. 720 at a temperature of 52° Fahr., and found to require the following corrections:—

	°
Dry bulb, No. 397	−0·1
Wet „ „ 395	−0·6
Maximum „ 1002	−0·0
Minimum „ 89	+0·3
Thermometer attached to standard barometer... ...	−0·1

Deerness.—August 11th-12th.—During a severe snowstorm last January, one of the stays to the cup-arms of the anemometer here was broken off, and the arm has since been supported by wire. On examining the upper portion of the instrument I found it badly

corroded in places, and two of the three remaining stays snapped with very slight pressure. Under these circumstances I thought it best to entirely remove them, as they were quite useless. I was fortunately able to obtain at Kirkwall some iron wire of the necessary strength, and had four new stays made and fitted with nuts and bolts.

The smith made a good job of it, and the exterior portion is now in good working order again, but requires painting—as does also the shed, both inside and outside—and Mr. Spence agreed to see to this before the winter.

The sperm oil was fluid, but discoloured; it was removed and fresh asbestos lubricant used.

The recording part was dismounted, and I gave extra time and attention to the adjustment of the velocity spiral, endeavouring to correct (1) the marking considerably above the 0 line at commencement of curves, and (2) the verticality of trace at the conclusion of a revolution.

I think the latter is now very much better, but although (1) is considerably improved I was not able to correct it entirely.

The gut winding line of the clock broke last autumn and was then spliced, and I found that the driving cord was also nearly cut through at the barrel-eye, so I fitted two new lines, and thoroughly cleaned clock, &c. The orientation—which was satisfactory—was tested before touching vane (*see* anemograph curve No. 224) and again after re-starting the anemometer, and the lines for the latter trial are shown on the sheet sent with this report, which also bears several traces made by revolving the velocity pencil after the corrections referred to above.

Mr. Spence states that he experiences trouble during severe snow storms owing to snow, driven on to the pencils and cylinder and wetting the sheet, and he would much like to have a cover for the recording part.

Fort William.—August 16th-18th.—The winding cord of the thermograph clock at this observatory broke the day before my visit, so I fitted a new line and thoroughly cleaned the clock. The action of the light shutter had been rather erratic. I gave attention to this and by altering the lifting and increasing the load on the locking arm the working was much improved, and when I left the observatory the shutter was running freely.

The barograph clock also needed looking to and oiling, and the pendulum beat was improved.

The lenses, mirrors, and condensers of both instruments were carefully cleaned.

August 17th proved to be stormy, with high wind and rain, and it was not possible to do anything outdoors, either to the rain-gauge or to the sunshine recorder, but I had a holder fitted to the spare rain-gauge pen, and also tested the various thermometers.

The action of the Beckley rain-gauge had been somewhat unsatisfactory at times during the previous winter, so on the next day I thoroughly overhauled it. There was—as far as I could ascertain—nothing radically wrong with the instrument; but I found that the observer who changed the sheets had been in the habit of setting the pen to the datum line by lifting the *cylinder* on its spindle instead of altering the height of the pen, which is the correct way. This, I

understood had been done because they could not drop the pen low enough to bring it down to the bottom scale line of the printed sheet.

I was able to correct this defect with the pen, and there is now a fair working margin for "setting" the pen, so the observer was instructed to discontinue raising the cylinder and to have it always hard down on its platform, and to make the necessary alteration for the datum line by raising or lowering the pen.

After thoroughly testing the discharges, water was run into the receiver for some hours, and the action of the float and discharger was found to be quite satisfactory, and I left the instrument in good order and acting very well. The trial curve thus obtained is appended to this report.

I left a supply of bands for binding sheets on the cylinder to check expansion in the very wet weather, and a supply of fresh ink, and the gauge should now give good results.

A new measure is required here for the Beckley gauge, and it would be more convenient in use and much less liable to get broken if it could be about half the length, and holding 0·25 inch instead of 0·50 inch, as heretofore, especially as there cannot be more than 0·20 inch to measure at any time.

The thermometers were compared with K.S. No. 720, at 55°, and require the following corrections:—

						°
Dry bulb, No.	671	...	...	...	...	0·0
Wet „ „	672	...	...	...	...	−0·2
Maximum „	1092	...	...	...	...	+0·1
Minimum „	1322	...	...	...	...	+0·6
Thermometer attached to standard barometer...					...	−0·3

Glasgow, August 20th-23rd.—Since my last visit here (1895), Dr. Becker has had a platform and guard rails erected on top of the iron lattice column on which the anemometer stands, and this renders inspection, &c. more convenient and less risky.

I entirely dismounted the exterior portion of the Robinson anemometer, and was agreeably surprised to find that the old asbestos lubricant in which the direction rollers had been working for the past two years was still clean and fluid. The only place where it had thickened and discoloured was in the cup containing the step-bearing, on which the lower end of the velocity shaft works.

All parts were cleaned and freshly lubricated with the sperm oil recently supplied by the Office.

The stays to the cup-arms are beginning to show signs of age, and the worm on the direction fan-spindle is wearing away rather rapidly.

The clock was oiled, and the orientation was examined and found good, and the sheet showing same is sent herewith.

There was nothing in the condition either of the barograph or thermograph calling for special remark.

The clock escapements, lenses, and mirrors received the customary attention.

A new water-tank has been recently fitted up in the thermograph screen, for the wet bulb thermometers.

The rain-gauge appeared to be working properly, but I examined it and cleaned the clock, &c. The action of float and discharger was tested by artificial fillings, and was found good.

The thermometers in use were compared at 60°, with K.S. 720, and found to require the following corrections:—

	°
Dry bulb, No. 708	−0·1
Wet „ „ 711	0·0
Maximum „ 58,846	+0·1
Minimum „ 63,942	+0·1
Grass minimum, No. 59,003	0·0
Thermometer attached to standard barometer... ...	−0·6

Alnwick Castle, August 25th-26th.—I had proposed this year, with the approval of Mr. Willyams to endeavour to dismount if possible all the exterior portion of the Robinson anemometer here, but the weather unfortunately turned out too wet and unsettled to carry out the proposal entirely, but I did all that was possible in the way of examination, &c., and satisfied myself, before leaving, that the instrument was working properly.

The anemometer is regularly attended to and oiled. I used asbestos lubricant for the present oiling, and it was agreed that this should be used in future, and a supply has been sent to Mr. Willyams.

The orientation was tested, and—considering the large amount of "back-leash" in this particular instrument—was satisfactory, and the sheet for same is appended to this report.

North Shields, August 27th-28th.—The anemometer at this station was in good condition and well lubricated.

The new fans and fan-spindle were fitted in July, but the vane seemed then to work rather stiffly, so Captain Harrison had the *lignum vitæ* bearings slightly reduced, which improved it. I dismounted the instrument and had all the parts overhauled.

The base of the cup-spindle showed signs of burring at the edge; this was ground down and surface smoothed, but I could not see any indication of "wearing" on the step-bearing for spindle. The oil in the cup for the direction rollers was only put in when the new fans were fitted, but the smith who does this work for Captain Harrison, stated that the oil (asbestos lubricant) he took out at the time was in good condition.

For the present lubrication I used the sperm oil supplied by the Office, and the opinion here is decidedly in favour of sperm oil.

The clock, and fittings of the pencils, required cleaning, which was done, and the instrument now is in good working order.

The orientation was checked as usual, and was good, and the sheet is sent herewith.

Yarmouth, August 31st-September 1st.—During the preliminary examination of the Robinson anemometer here, I found that several of the small cheese-head screws holding the cover round direction platform were missing, and the others plugged, the threads being worn. These screws have been faulty for some time, so I thought it advisable to have a new set tapped and drilled and fitted with washers, so that now the new screw-heads project well beyond the cover and are not sunk flush as were the old ones, rendering them liable to be painted over and difficult to find.

The instrument was taken to pieces and all parts seemed in good order and properly oiled, excepting that the cup at top of velocity

spindle was practically dry, the oiling hole having been accidentally painted over. I had the hole cleaned out, and instructed observer to use it frequently.

The asbestos lubricant was in very good condition; it was removed and sperm oil supplied by the Office used. All parts, both interior and exterior, were cleaned, &c. Just before restarting instrument it was noticed that the coupling rod of the velocity pencil was loose. The dislocation was found to be just under the principals of the roof, which made it awkward to attend to.

The upper part of coupling rod is screwed, but not pinned, and it is probable that the lower part had been depending for some time on the last turn or so of the thread. To prevent the danger of this occurring again I screwed rods hard home, and had holes drilled above and below the joint, and bound it round with copper wire.

The orientation was examined before and after dismounting instrument, and was good in each case. Sheet showing the first test is sent herewith, and the others will be found on the anemograph curve for August 31st-September 1st.

Telegraphic Reporting and Climatological Stations.

Alnwick, August 24th.—The thermometers here were in good order and appear to be properly looked after. They were compared at 60° with Kew Standard No. 720, and found to require the following corrections:—

	°
Dry, 54,385	−0·1
Wet, 54,381	−0·3
Maximum, 83,756	−0·1
Minimum, 55,769	+0·4

The 5-inch bottle rain-gauge is very old, and has been frequently repaired. I noticed a hole at side just below the rim; it was promised that this should be soldered up at once.

I took a "squeeze" of the rim, which is sent with this report.

North Shields, August 26th.—I found the thermometer at this station in good order and the muslin of the wet bulb was clean and well moistened. The screen has been strengthened by additional footings.

Comparisons of the thermometer with Kew Standard No. 720 at 60°, showed that they required corrections as below:—

	°
Dry bulb, B.T. 4187	−0·1
Wet „ „ 3344	−0·2
Maximum, M.O. 55	−0·3
Minimum, M.O. 2474	+0·6
Spare tube, B.T. 4384	0·0

I got Mr. Clarke, who acts for Mr. Irvine, to read the thermometers and barometers with me, and his observations were satisfactory and dependable, and he appears to be much interested in the instruments.

The rain-gauge has been badly treated. The rim was deeply indented, apparently by heavy stones. I had the edge hammered out and the rim "trued" as much as possible, and it is now fairly good, as will be seen by the "squeeze" sent herewith

Yarmouth, August 30th.—The thermometers, screen, and rain-gauge at this station were in good order, with the exception that the minimum was reading 1° too low, but by heating up the chamber this was reduced to the normal error.

The thermometers, compared at 62° with Kew Standard 720, require the following corrections:—

	°
Dry bulb, B.T. 1542	0·6
Wet „ „ 1665	—0·1
Maximum (no number)	—0·4
Minimum, No. 2480	+0·5
Spare tube, B.T. 515	—0·6

(The maximum is not divided on the stem.)

Radcliffe Observatory, Oxford, November 4th-5th.—The exterior part of the Robinson anemometer here has not been taken down for several years, as it is risky owing to the unprotected position of the instrument, but on examination I found that the remaining old oil in the bottom of the trough in which the direction rollers work had become so very thick and dirty that it was really necessary that the instrument should be dismounted.

The weather on the morning of November 4th, luckily, was calm, and with the aid of the observatory staff, I was able to take down the cups, velocity shafts, &c., and every part was overhauled.

The oil on direction rollers had thickened, and they would only move with considerable pressure—they were soaked in paraffin and well cleaned.

The old oil was all removed and new asbestos lubricant used, and the anemometer is now again in very good order.

The orientation was tested and found good, and the check sheet is sent herewith.

The barograph and thermograph were found to be in their usual first-class condition, and the photographic curves are very good.

The rain-gauge is working properly and the pen supplied last year has given satisfaction, but there is occasional trouble owing to the swelling of the Willesden sheets in very wet weather.

The thermometers in use were compared with K.S. No. 720. at 50°, and found to require the following corrections:—

	°
Dry bulb, No. 576 in thermograph screen	—0·1
Wet „ „ 575 „ „	—0·2
Dry „ „ 1710 in Stevenson „	—0·3
Wet „ „ 1709 „ „	—0·2
Maximum, No. 356 „ „	—0·4
Minimum, „ 363 „ „	—0·0
Grass minimum, No. 70,852	+0·4
Thermometer 17,249, attached to Newman barometer [for readings above 32°]	—0·6
Thermometer 1708, attached to Newman barometer [for readings below 32°]	—0·3

(Signed) E. G. Constable.

Inspection of Anemometers at Holyhead, 1897.

Bridled Anemometer.

I dismounted this instrument and carefully examined it in every part.

The cups were in better order than when I last saw them, and were very little dented, if at all, by stones having been thrown at them.

The various bearings were free and clean, and the sperm oil had worked very well indeed; the whole was thoroughly cleaned and re-erected, and left in good order.

I again tested the zero point of the instrument, and after looking very carefully into the position of the arm carrying the pen, I satisfied myself that it could not be in its proper place, although Davis assured me that when he first took charge of the instrument several years ago, it was fixed as I then saw it. After shifting it I at last got it into the position it was evidently intended to be in, as the screws for securing it fitted the holes in the spindle much better than in the other position. It seems clear that from the first the arm has been improperly fixed. I made a series of trials and placed a new zero mark upon the cylinder for the purpose of setting the sheets, and for the future this mark will be used; the change will not affect the accuracy of the previous records, but it will give the pen a much longer range, and reduce the chance of its getting beyond the top limit of the paper in very heavy gales.

The pen fitted in 1895 is working very satisfactorily, and appears to meet the requirements of the instrument in every respect.

Pressure-Tube Anemometer.

This instrument was also dismounted and carefully examined.

Its adjustment was found to be correct, and, except that the observer appears to have some difficulty at times with his pen, the traces obtained were satisfactory.

When opened I found the water fairly clean, but considerable electrolytic action had been going on in the container, with the result that the solder had become partially decomposed, and a thick deposit of lime had been thrown down along all the joints in the vessel, and upon the mass of metal at the foot of the float, placed there for the purpose of adjusting its weight and balance.

The water used was from the ordinary town supply, and as no such action has occurred elsewhere, so far as my experience goes, I concluded that the result must have been due to some constituent peculiar to the water of the district; the water is certainly very "hard," and contains a good deal of lime.

To guard against a continuance of the action I used rain water to refill the container; and I also asked the observer to again open it and examine the inside in three months' time, and then to take the further precaution to refill with rain water which has first been well boiled.

The glass shade I found broken, and a new one is required at once; and also a fresh supply of ink for both this and the bridled anemometer.

I fitted a reservoir pen, of a new kind, which I asked the observer to try, and which I think may be an improvement upon the pen he has hitherto used.

New Pressure Plate Anemometer.

For the erection of this instrument Mr. Cotton kindly gave me a square block of dressed stone which was sunk in the ground, levelled, and bedded in concrete, and formed an excellent base upon which the foot of the pillar could be bolted.

In addition to the bolts the pillar was further secured by three wire stays, which were attached at their lower ends to iron eyes fixed in large pieces of stone sunk in the ground. When properly stayed I found the mast to be quite firm, and it stood very well indeed the strain of a strong wind (force 8) which commenced to blow immediately afterwards.

The height of the plate above ground is 26 feet, and the mast is placed 6 feet away from the south-west angle of the hut which carries the bridled anemometer.

After trial I discarded the stiff brass wire cord supplied with the instrument, and used instead some of the flexible copper cord which answers so well with the bridled anemometer.

I explained to both Mr. Cotton and his assistant, Mr. Davis, the construction of the instrument, and the method of setting and reading it; and I also settled the form in which the observations should be recorded and sent to the Meteorological Office.

Robinson Cup Anemometer.

The velocity trace of this instrument was not quite satisfactory, as a considerable shake was shown in the lines whenever the wind was strong. I found that this was due to two causes, the bevelled wheel which turns the velocity pencil was not "sitting" properly upon its bearing; and the clock was a little out of place, and did not gear properly to the cylinder. The latter was due to the fact that the clock was not originally made for the stand on which it is placed, and a little readjustment was required to make it fit; this is now done, and the clock cannot again shift.

The instrument generally was in good order and has evidently been attended to carefully. It was entirely dismounted and examined, cleaned in every part, and re-erected and oriented satisfactorily.

The sperm oil used last year was found to be perfectly limpid and good; in no part was there any tendency shown for it to become sticky or thick; and it was only discoloured by the wearing of parts in contact with it.

One of the stay-rods of the direction fan was found to be broken, and it required to be soldered.

General Note.

Salt Island Instruments.—Upon the whole the instruments on Salt Island appear to have been less tampered with during the past year than has been the case during some preceding years.

The principal harm seems to have come from loafers, who idle about at the end of the island with nothing to do, and cut the wood-work of the hut, or do other mischief thoughtlessly and because it happens to be at their hands to do. Mr. Cotton advocated the erection of a dwarf wall of dry stone, which would keep them away from the hut and the pillars of the pressure-tube and pressure-plate

instruments, and thus lessen the temptation to do mischief. He told me that if the Office would pay for the erection of such a wall the cost would be only that of labour (3*s.* 6*d.* per lineal yard), as there was plenty of stone on the spot the free use of which could be had.

As authorised, I ordered a notice board to be painted and affixed to the hut.

Robinson Anemometer. — Whilst at Holyhead an opportunity presented itself for testing experimentally the theory I had previously put forward to account for the smaller record yielded, with certain winds, by the Robinson cup anemometer, as compared with that yielded by the anemometers on Salt Island (Report for 1895-6).

The periodical fire-drill took place on the pier, during a strong wind from west, and the water from the hose being thrown up upon the roof, over the open end of the sheds, into which the wind was blowing, I noticed that the water was distinctly drawn *backwards* and *downwards into* the opening, instead of going freely over the roof as it would otherwise have done.

(Signed) R. H. Curtis.

September, 1897.

APPENDIX VI.

Method of Dealing with Telegraphic Weather Intelligence.

The operations connected with the preparation and issue of the Forecasts and Storm Warnings have not undergone any material change.

Full details will be found in Appendix X. to the Report for 1891

Daily Weather Report.

The Office receives, when the telegraphic communications are perfect, sixty reports each morning, eighteen each afternoon (except on Sundays), and twenty-nine each evening, the arrangement of which is explained in the Annual Reports for recent years.

The change made in the Daily Weather Report during 1894, by the insertion of Reports from the Azores (forwarded by the courtesy of the Portuguese Meteorological Authorities), is still in force. The Report fills four large quarto pages, as it has for several years past.

The standing portions (maps, &c.) are printed in blue, and the information for each day is in black.

The Monthly "Correction and Addition List" is published as before.

The subscription for the Report is—

For delivery by hand, where feasible, £2 *per annum;*
„ *by book post* £1 „

N.B.—Subscriptions are payable in advance, Annually or Quarterly: those for a Quarter end at the Official Quarter days, *e.g.*, March 31, June 30, &c.

Weekly Weather Report.

The Weekly Weather Report, which has appeared since February 1878, and was re-arranged at the commencement of 1890, is prepared for the calendar week, Sunday to Saturday, and is steadily increasing in value. It is published regularly on Thursdays, and is illustrated by three maps for each day, which, like those in the Daily Reports, show the outline of the land and surface of the sea in blue, while the daily information is in black. The maps show (1) for 8 a.m., the temperature weather, and sea disturbance; and (2) for 8 a.m. and (3) for 6 p.m., the distribution of pressure, and the winds, over, and on the coasts of, Europe. The information on the first and second pages of each Report consists of observations of Temperature and Rainfall made at 78 stations, the individual values for which are given on the second page of the Report. Sunshine records taken at 60 stations are given on the second and sixth pages of each Report. The Reports from Harrogate have ceased. A new station (Cranley) has commenced reporting, and the observations will be found in District 5.

Tables of *Accumulated Temperature*, designed to give persons engaged in agriculture better means for estimating the manner in which vegetation is affected by temperature than that afforded by the more usual methods of treating the readings of the thermometer, are still published on the first and second pages, and show for each week, and for the whole period from the beginning of the year, the weekly and progressive values respectively, of the combined amount and duration of the excess or defect of the air temperature, above or below a suitably fixed standard, or *base temperature*. The base value adopted is 42° Fahr.

Accumulated Temperature is expressed in *Day degrees*; a Day-degree signifying 1° F. of excess or defect of temperature above or below the base (42° F.) continued for 24 hours, or any other number of degrees for an inversely proportional number of hours.

The following are the rules for computing, for a weekly period, from the observed maxima and minima, the accumulated temperature above or below 42° F.:—

1. Obtain the mean temperature, from the means of the seven observed maxima and minima, suitably corrected for non-periodic changes of temperature.

2. In obtaining the accumulated temperature four cases may occur, to which the following rules will apply:—

Conditions of Temperature.	To obtain the daily Accumulated Temperature.	
	Above 42° F.	Below 42° F.
If the minimum is *above* 42° F., or *equal* to 42° F.	Subtract 42° F. from the mean.	There is none.
If the minimum is *below* 42° F., but the mean for the day is *above* 42° F.	From the difference between the mean for the day and the minimum deduct the accumulated temperature below 42° F., calculated as stated in the next column.	The required quantity is the excess of 42° F. over the minimum, multiplied by the coefficient 0·4.
If the mean for the day is *below* 42° F., but the maximum is *above* 42° F.	The required quantity is the excess of the maximum over 42° F., multiplied by the coefficient 0·4.	From the difference between the mean for the day and the minimum deduct the accumulated temperature above 42° F., calculated as stated in the preceding column.
If the maximum is *below* 42° F., or *equal* to 42° F.	There is none.	Subtract the mean from 42° F.

In each of the above cases the result will be the average *daily* value, and must be multiplied by 7 in order to obtain the value for the whole week.

The coefficient varies with the duration of the period, and also with the base temperature.

The co-efficient given above, in Rules 2 and 3, is for a weekly period, and for the base temperature 42° F. The following are its values for other base temperatures,—for 32° F., 0·4; for 52° F., 0·33; for 62° F., 0·25.*

* A full explanation of the principles on which these rules are based will be found in Appendix II. to the Quarterly Weather Report for 1878.

In addition to the reports from the Telegraphic Reporting Stations, and the returns from certain self-recording Observatories, weekly schedules from 56 volunteer observers are used, the names of the stations and observers being given in Appendix XI., p. 88.

An early copy of the MS. of the Report is prepared on Tuesday in every week, and the summary on its first page is sent to several papers on that evening; the printed copies of the complete Report are ready for sale on Thursday afternoon.

Summaries and Appendices to the Weekly Weather Reports.

The *Monthly Summary Supplement* gives the average values for Pressure, Temperature, Rainfall, and Bright Sunshine of the current month, and the difference between these values and the means for the corresponding months in a long series of years, together with the number of days on which rain, snow, hail, thunder, &c., &c. occurred, and the number of days on which the wind blew from the eight principal points of the compass, and a brief *résumé* of the principal features which have marked the weather of the month. It is illustrated by four maps, showing the distribution of the average pressure and temperature and of the rainfall for the period, and the movements of the principal depressions which have passed over the British Islands and their neighbourhood. In the course of this year the number of Stations reporting Sunshine has increased largely, so that the arrangement of the Tables on pp. 2, 3 and 4 of each Summary has been modified somewhat.

Two Appendices, I. and II., have appeared, similar to those for several recent years.

Issue of Forecasts.

Remarks on the actual state of the weather, and Forecasts *for not more than one day in advance*, are prepared at the Meteorological Office as under: —

*On Week Days.**

(1.) At 11 a.m. (from the morning reports), for the 24 hours ending at Noon on the day following the date of issue. These are intended especially for the early editions of the evening papers, for the clubs, and for exhibition at certain selected places (see note on page 10).

(2.) At 3.30 p.m. (from the morning and afternoon reports), for the day following that of issue. This set of forecasts is supplied to a few newspapers and a copy is exhibited regularly at the door of the Meteorological Office. During the Hay Harvest they are telegraphed to about 28 well-known agriculturists, to be made known in their neighbourhood (see p. 11).

(3.) At 8.30 p.m. (from the 8 a.m., 2 p.m., and 6 p.m. reports), for the civil day following that of issue. These are supplied gratis to any newspaper or news agency which may apply for them, and send for them regularly. A very large number of the more important papers and news agencies avail themselves of this advantage.

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* Good Friday, Christmas Day, and Bank Holidays are reckoned as Sundays.

The forecasts are made for the following districts:—

0. SCOTLAND, NORTH.
1. SCOTLAND, EAST.
2. ENGLAND, N.E.
3. ENGLAND, EAST.
4. MIDLAND COUNTIES.
5. ENGLAND, SOUTH (and English Channel).
6. SCOTLAND, WEST (with Isle of Man).
7. ENGLAND, N.W. (with North Wales).
8 ENGLAND, S.W. (with South Wales).
9. IRELAND, NORTH.
10. IRELAND, SOUTH

The remarks and forecasts are posted at the doors of the Meteorological Office, 63, Victoria Street, S.W., on week days,* for the inspection of the public. Copies or extracts from them, are communicated under the conditions stated below, but no information which is not substantially included in them will be supplied.

A series of boards is exhibited on the front of the Office showing in large type the state of the wind, weather, and sea disturbance at six stations, situated on our S.E., S., and W. coasts. The stations selected are Yarmouth, Dungeness, The Needles, Scilly, Holyhead, and Valencia (Ireland), and the observations posted up are those for 8 a.m. and 2 p.m. daily, except on Sundays,* the boards being changed at about 9h. 45m. a m. and 3h. p.m. The information can be easily read from the street.

FORECASTS FOR SUBSCRIBERS.—Any person can be supplied with a copy of the Forecasts by post, once on each week day,* on payment of a subscription of ten shillings per annum, or 2*s.* 6*d.* per official quarter, or any part thereof, *in addition to the cost of transmission;* the charges will therefore be, by *letter* post, 9*s.*, by *book* post, 5*s.* 9*d.*, per quarter.

The forecasts for any individual district and for any of the hours mentioned above can be forwarded by telegraph, on payment of 3*d.* per day for any definite period, in addition to the cost of transmission.

FORECASTS FOR CLUBS.—These are drawn up at 11 a.m., for all the districts, and are supplied to Clubs, for a subscription of ten shillings per annum. They are delivered by hand to Clubs situated in or near Pall Mall. Special arrangements can be made for delivery at a greater distance by hand or by post

FORECASTS FOR HAY AND CORN HARVESTS, OR FOR PUBLIC USE.—Special facilities are offered for the transmission of Forecasts for these purposes, a nominal fee of 2*s.* 6*d.* being charged for an official quarter or any part thereof, in addition to the cost of the telegrams. These are supplied only to Agriculturists, or to persons making public use of them.

*** Good Friday, Christmas Day, and Bank Holidays are reckoned as Sundays.**

Exhibition of Telegraphic Forecasts at Local Post Offices.—The Post Office has sanctioned the exhibition of Forecasts at Local Post Offices, provided space is available, if the persons to whom they are addressed desire them to be so exhibited instead of being delivered to themselves.

Unless otherwise arranged, all forecasts transmitted by post are sent by book post, not as letters.

Inquiries as to the Weather.

Inquiries Personally or by Messenger.—Any person applying at the Meteorological Office between 11 a.m. and 8 p.m. on week days, and between 7 p.m. and 8 p.m. on Sundays,* can be supplied, in writing, with the latest information in the possession of the Office, with regard to the weather in any district, or the latest forecast issued for any specified district, on payment of one shilling for each inquiry.

Inquiries by Letter.—Application may be made by letter, enclosing thirteen pence in stamps if the reply is to be *by post*, and one shilling in stamps, *in addition to the cost of the reply* (consisting of ten words, exclusive of the address) if the reply is to be *by telegraph*.

Inquiries by Telegraph.—Any person may obtain *by telegraph* from the Meteorological Office the latest information as to the weather in, or the latest forecast for any district of, the United Kingdom by payment of a fee of one shilling *in addition to the cost of a telegram and reply to any post office.* The telegram containing the inquiry must be addressed as follows:

To

Weather,

London.

The payment for the reply should be for at least ten words in addition to the address.

Application may also be made for similar information to be sent either *by telegraph* or *post* on any future specified day.

Checking of Forecasts and Storm Warnings.

The forecasts and storm warnings issued by the Office are carefully checked by being compared with the conditions actually experienced during the time to which they refer. The method adopted was fully explained in the Annual Report for 1891, and the results for 1897 will be found on pp. 11-15.

In order to render the information in the possession of the Office as to the weather experienced on our coasts still more complete, the Council have, as in preceding years, obtained from the various Light-house Boards the original log-books from some of the most exposed lightships and lighthouses. They again express their cordial thanks for the co-operation so readily granted to them by these Boards.

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* Good Friday, Christmas Day, and Bank Holidays are reckoned as Sundays.

APPENDIX VII.

Report on the Comparison of the Forecasts issued at 8h. 30m. p.m. with the Weather subsequently experienced, for the 12 Months, April 1897 to March 1898. The results are for the United Kingdom as a whole.

The letters used have the following signification:—

a=complete success.	c=partial failure.
b=partial (more than half) success.	d=total failure.

The checking has been conducted on the same system as that employed in previous years, *i.e.*, each forecast has been considered under the separate headings of "Wind" and "Weather," but the results of the 8.30 p.m. Forecasts only are here published.

The first column gives the per-centage of success in "Wind," the second in "Weather," and the third the average of the other two.

The Summary for the various districts is given at page 11.

Months.		Per-centages. Wind.	Weather.	Average.	a + b.
April	a	48	58	53	77
	b	21	23	24	
	c	21	13	17	
	d	7	6	6	
May	a	53	66	60	85
	b	29	21	25	
	c	13	7	10	
	d	5	6	5	
June	a	57	59	58	81
	b	22	23	23	
	c	14	12	13	
	d	7	6	6	
July	a	66	71	69	88
	b	21	17	19	
	c	11	7	9	
	d	2	5	3	
August	a	46	55	51	78
	b	28	27	27	
	c	23	12	18	
	d	3	6	4	
September	a	46	57	52	83
	b	32	30	31	
	c	12	8	10	
	d	10	5	7	
October	a	48	52	50	79
	b	34	24	29	
	c	14	15	15	
	d	4	9	6	
November	a	46	55	51	75
	b	23	26	24	
	c	24	10	17	
	d	7	9	8	
December	a	49	60	55	82
	b	26	28	27	
	c	20	6	13	
	d	5	6	5	
January	a	54	60	57	84
	b	29	25	27	
	c	14	8	11	
	d	3	7	5	
February	a	41	63	52	83
	b	37	25	31	
	c	18	8	13	
	d	4	4	4	
March	a	49	64	57	82
	b	29	21	25	
	c	16	9	12	
	d	6	6	6	
The entire year	a	50	60	55	81
	b	23	24	26	
	c	17	10	14	
	d	5	6	5	

APPENDIX VIII.

Storm Warnings.

The Meteorological Office issues notices of atmospherical disturbances on or near the coasts of the British Islands (free of charge) to ports and fishing stations recommended by responsible local authorities.

The fact that one of these notices has been received at any station is made known by hoisting a black canvas cone, 3 feet high and 3 feet wide at base, which has the appearance of a triangle when hoisted. The telegram directing the cone to be hoisted should be exhibited near the signal staff.

At dusk, whenever a signal ought to be flying if it were daylight, a night signal, consisting of three lanterns hung on a triangular frame, may be hoisted in place of the cone.

The Meteorological Office supplies the canvas cone, but does not undertake to supply the lanterns. In all cases the local authorities must undertake the charges incidental to the hoisting of the signal, such as flagstaff and gear, oil, &c., and also as to the keeping of the apparatus in repair, painting, &c.

The following is a list of the stations to which storm-warning telegrams are sent:—

NORTHERN.	WESTERN.	SOUTHERN.	EASTERN.
Scotland, N.E.	Ireland, S.W.	England, S.W.	England, N.E.
Lerwick.	Tuskar L.H.	The Lizard.	Berwick-on-Tweed.
Dunrossness.	New Ross.	Falmouth.	Cullercoats.
Sumburgh Hd. L.H.	Dunmore East.	Pendennis.	Tynemouth.
Scalloway.	Dungarvan.	Mevagissey.	South Shields.
Stromness.	Minehead L.H.	Mount Batten.	Souter Point L.H.
Kirkwall.	Youghal.	Plymouth.	Sunderland.
Cantick Head L.H.	Queenstown.	Devonport.	Hartlepool.
Holborn Head.	Cork.	Prawle Point.	Middlesborough.
Dunnet Head.	Passage.	Teignmouth.	Redcar.
Wick.	Kinsale.	Exmouth.	Flamborough Hd.
Tarbet Ness L.H.	Do. (Old Head).		Whitby.
Avoch.	Galley Head L.H.		Filey.
Inverness.	Castletownshend.		Bridlington.
Nairn.	Brow Head.		Hull.
Burghead.	Tralee.		Goole.
Lossiemouth.	Limerick.		Grimsby.
Buckie.	Loophead L.H.		Boston.
Port Knockie.	Galway.		
Cullen.			
Portsoy.	Ireland, N.W.		
Banff.			
Fraserburgh.	Tory Island L.H.		
Peterhead.	Rathmullan.		
Aberdeen.	Malin Head.		
Girdleness L.H.	Portrush.		
	Port Ballintrae.		
	Irish Sea.		
	Belfast.		
	Donaghadee.		
	Burr Point.		
	Howth.		
	Kingstown.		

[*Continued.*

NORTHERN.	WESTERN.	SOUTHERN.	EASTERN.
SCOTLAND, E.	IRISH SEA—*cont.*	ENGLAND, S.	ENGLAND, E.
Stonehaven.	Pt. of Ayre (I. of M.)	Guernsey.	Sutton Bridge.
Montrose.	Ramsey „	St. Helier's (Jersey).	Lynn.
Scurdy Ness L.H.	Douglas „	Gorey „	Sheringham.
Broughty Ferry.	Castletown „	Weymouth.	Cromer.
Dundee.	Silloth.	Anvil Point L.H.	Great Yarmouth.
St. Andrews.	Maryport.	Poole.	Southwold.
Anstruther.	Workington.	Southampton.	Orford Ness L.H.
Pittenweem.	Whitehaven.	Hamble.	Ipswich.
Buckhaven.	Barrow.	Yarmouth.	Harwich.
Wemyss, West.	Morecambe.	Cowes.	Gunfleet L.H.
Burntisland.	Fleetwood.	Ryde.	
Grangemouth.	Blackpool.	St. Catherine's Pt.	
Bo'ness.	Lytham.	Portsmouth.	
Granton.	Southport.	Littlehampton.	
Newhaven.	Formby.	Brighton.	
Leith.	Liverpool.	Newhaven.	
Fisherrow.	Runcorn.		
Dunbar.	Hoylake.		
Cockburnspath.	New Brighton.		
St. Abb's Head.	Connah's Quay.		
Eyemouth.	Penmaenmawr.		
	Port Penrhyn.		
	Point Lynas L.H.		
	Holyhead.	ENGLAND, S.E.	
	South Stack L.H.	Eastbourne.	
	Caernarvon.	Hastings.	
	Port Dinorwic.	Rye.	
SCOTLAND, N.W.		Sandgate.	
Fair Isle L.H.	ST. GEORGE'S CHANNEL.	Folkestone.	
C. Wrath L.H.	Aberystwyth.	Dover.	
Stourhead L.H.		Deal.	
Port of Ness.	BRISTOL CHANNEL.	Ramsgate.	
Stornoway.	Milford.	North Foreland.	
Portnaguiran.	Pembrey.	Margate.	
	Llanelly.	Faversham.	
	Swansea.	Sheerness.	
	Briton Ferry.	Chatham.	
	Porthcawl.		
	Nash L.H.		
	Penarth.		
SCOTLAND, W.	Cardiff.		
	Do. (Bute Dock).		
Glasgow.	Do. (Barry Dock).		
Greenock.	Newport.		
Rothesay.	Weston-super-Mare.		
Lamlash.	Burnham.		
Carradale.	Bridgewater.		
Campbelton.	Lundy Island.		
Mull of Cantire L.H.	Ilfracombe.		
Rhinns of Islay L.H.	Bull Point L.H.		
Ardrossan.	Barnstaple.		
Girvan.	Appledore.		
Ballantrae.	Hartland Pt. L.H.		
Cairn Ryan.	Boscastle.		
Corsewall Point L.H.	Port Isaac.		
Mull of Galloway L.H.	Newquay.		
	Hayle.		
	St. Ives.		
	St. Sennen.		
	Newlyn, West.		
	Penzance.		
	Scilly.		

APPENDIX IX.

Fishery Barometers.

List of Places supplied with Fishery Barometers.

Shetland Isles.—Balta Sound, Uya Sound, Burravoe, Nesting, Lerwick, Sandwick, Scalloway, Symbister.

Orkney Isles.—Westray, Papa Westray, Burray, Kirkwall.

Scotland, east coast.—Duncansbay, Freswick, Auchengill, Keiss, Ackergill, Staxigoe, Wick, Lybster, Dunbeath, Inver, Portmahomack, Ballintore, Cromarty, Avoch, Nairn, Burghead, Portessie, Port Knockie, Portsoy, Whitehills, Gardenstown, Rosehearty, Pitullie, Fraserburgh, Inverallochy, Pointlaw, Findon, Portlethen, Skateraw, Stonehaven, Arbroath, Broughty Ferry, St. Andrews, Crail, Cellardyke, St. Monance, Burntisland, Newhaven.

England, east coast.—Berwick, North Shields, South Shields, Sunderland, West Hartlepool, Staithes, Scarborough, Filey, Flamborough, Bridlington Quay, Withernsea, Hull, Lynn (2), Wells, Gorleston, Lowestoft, Orford Haven, Felixstowe, Harwich, Brightlingsea, West Mersea, Maldon, Leigh, Margate, Deal, Kingsdown, Dover.

England, south coast.—Bognor, Ryde, Bembridge, Brixton, Atherfield, Ventnor, Yarmouth (Isle of Wight), Gorey (Jersey), Haslar Hospital, Poole, Weymouth, Portland, Budleigh Salterton, Exmouth, Cawsand, Mevagissey, Gorranhaven, Devoran, Portscatho, Penryn, Durgan, Porthallow, Falmouth, Coverack, Newlyn (2), Mousehole, Penberth, Porth Guarra.

England, south-west coast.—St. Ives, Hayle, Port Isaac, Boscastle, Bideford, Burham, Highbridge, Weston-super-Mare.

Wales.—Briton Ferry, Swansea, Angle, Milford, Aberystwyth, Nevin, Carnarvon.

England, north-west coast.—Fleetwood, Morecambe, Maryport.

Isle of Man.—Douglas, Port St. Mary, Peel (2).

Scotland, south-west coast.—Port Patrick, Stranraer.

Ireland, east coast.—Cushendall, Belfast, Bangor, Groomsport, Donaghadee, Ardglass, Warren Point, Carlingford, Greenore, Dundalk, Malahide, Howth, Kingstown (2), Bray, Wicklow.

Ireland, south coast.—Dunmore East, Dungarvan, Crosshaven, Kinsale, Union Hall, Castletownsend, Baltimore, Schull (2), Crookhaven, Castletown (Berehaven), Lawrence Cove, Ballydonegan, Ballycrovane.

Ireland, west coast.—Valencia, Dingle, Tralee, Ballyheigue, Tarbert, Kilcredane, Kilronan, Galway, Spiddal, Cleggan, Ballyglass, Ballycastle (Co. Mayo), Donegal, Tribane, Killybegs, Teelin, Malinmore, Portnoo, Burton Port, Kincaslagh, Bunbeg.

Ireland, north coast.—Dunfanaghy, Rathmullen, Buncrana, Malin Head, Moville, Greencastle, Portstewart, Portrush, Port Ballintrae, Ballycastle (Co. Antrim).

Scotland, west coast.—Lamlash, Tarbert (Loch Fyne), Loch Ranza, Campbeltown, Carradale, Portree, Armadale (Isle of Skye), Isle of Soay, Plockton, Shieldaig, Gruinard, Badachro, Ullapool, East Mey, Gills, Stroma (2).

Hebrides.—Stornoway, Portnaguran, Obb, Valtos, Carloway, Ness.

APPENDIX X.

Methods followed in dealing with Meteorological Returns from Land Stations in the British Isles.

These stations are of seven classes, as stated on page 16.

I.—*Observatories continuously observing all the Meteorological Elements.*

Returns from observatories.

Hourly measurements of the curves obtained from the self-recording instruments at the observatories of the Office are made by the observers at each station, on printed forms supplied for the purpose, which, together with the curves, are forwarded to the Office weekly. They comprise measurements of the barograms, of the dry-bulb and wet-bulb thermograms, of the anemograms, and of the rain-gauge curves.

Examination of returns.

The measurements are subjected to a careful examination in order to ensure as far as possible their accuracy, and the revised regulations which have been adopted to secure this end will be found in the Report of the Office for 1890. They comprise rules for the guidance of the observers, as well as of the assistants charged with the examination of the work at the Office. Attention need be called here to only two of these rules, viz., (*a*) the use of subsidiary sheets on which are entered the results of a second set of measurements of the curves made after, and quite independently of, the first set, and with a different form of scale, the two sets of measurements being afterwards compared together, and any differences found inquired into and set right; and (*b*) the re-measurements of the curve made by the assistants at the Meteorological Office, and which always amount to 40, and in doubtful cases to many more, per month, for each element.

Results of examination and report to Council.

The attention of the observers is always drawn to such errors as may be detected, and to any failures in the continuity of the curves arising from failure of the light, stoppage of the clock, defective photography, faulty action of the wet-bulb thermometer, &c.; a report containing the results of the examination of each observatory being also submitted to the Council periodically. The tabulations are eventually bound and stored with the curves in the Office.

General supervision of observatory work.

In connection with this work should be mentioned the general watch which has to be kept over the working of the observatories and of the instruments, not only to secure uniformity amongst them and observance of rules, but also to guard against small changes which are liable to occur at certain times, especially with the thermographs, and which may affect the scale-values of the instrument or the datum lines used for the tabulation of the curves. About twice a year this work calls for special examination, entailing some considerable time, and occasionally the engraving of new scales, for measuring the curves.

Method of dealing with the Numerical Results from the Self-recording Observatories.

Interpolations.

In dealing with the tabulations the first step is to go over the sheets and fill up by interpolation, wherever possible, any gaps or breaks in the continuity of the record.

The records having been made as complete as possible, are then used for the calculation of daily and hourly mean values, for periods of five days, calendar months, and for the year; which, together with other data obtained from the same source, are published under the title of "Hourly Means of the Readings obtained from the Self-Recording "Instruments at the Five Observatories under the Meteorological "Council." The volume for 1895 is in the press. See p. 18.

It will be noticed that this publication includes results from only five observatories, while on page 17 seven observatories are mentioned. This is owing to the fact that since the year 1884 the records at Glasgow and Stonyhurst have not been fully published by the Office (although the stations are partially subsidized by it, in order to maintain the record established in 1868 and published for the years 1869 to 1883), where, however, the curves are stored for future use if required.

Returns from both these observatories are published in "Returns from Stations of the Second Order," and meteorological results for Stonyhurst and Falmouth are printed independently by the College authorities, and by those of the Royal Cornwall Polytechnic Society.

II.—*Anemographic Stations at which the Wind is recorded continuously.*

Anemographs.

The anemograms received from Alnwick Castle, Armagh, Deerness, Dublin, Fleetwood, Holyhead, North Shields, Scilly, and Yarmouth are regularly examined and tabulated in the Office (except those for Armagh, which are tabulated at the Observatory), and the sheets bound up in volumes. Besides special inquiries on legal and other points which arise from time to time, and in which these documents are of high importance, the tabulations are always employed in the preparation of the various Reports issued by the Office. They are also regularly used in the checking of the Storm Warnings.

III.—*Barographic Stations at which the Atmospheric Pressure is continuously recorded.*

Barographs.

These stations are for the most part either telegraphic reporting stations or stations of the second or third orders. The instrument in most general use is Richard's self-recording aneroid. At the telegraphic stations the record is first used to indicate to the observers the changes which have occurred since the last observing hour, and these changes, when large, are reported by wire to London, and are used in preparing the forecasts. The curves themselves are forwarded to the Office weekly and are stored for future use.

IV.—*Sunshine Stations at which the duration of Bright Sunshine is continuously recorded.*

Sunshine records.

The daily sunshine cards which are now received from 57 Stations in the British Islands are examined generally, to guard against accidental changes in the adjustment of the instruments. Notes explaining any omission or accidental defect are added to the cards, if required, and after their receipt has been acknowledged, they are duly stamped, dated and then stored in the Office.

Weekly totals.

A tabulation of most of the curves is published in the Weekly Weather Report, mentioned in Appendix VI., and for those stations, which are also Stations of the Second Order, the monthly totals of bright sunshine in hours, together with the per-centages of its possible duration, are published as Part IV. of "Returns from Stations of the Second Order." Hourly tabulations are made in the Office of the returns from the observatories, and the mean hourly amounts are published in the volumes of "Hourly Means." A table showing the daily amount of sunshine at Bunhill Row, one of the London stations, is also prepared quarterly, for the Royal Meteorological Society.

V.—*Telegraphic Reporting Stations.*

These are 30 in number in these islands, and the particulars as to the observations taken at them, and the methods adopting in dealing with them, will be found fully detailed in Appendix VII. to the Report for 1888-89, and in Appendix VI. to the present volume.

VI.—*Land Stations.*

Origin and progress of system.

Ever since the year 1866 returns of more or less completeness have been received from land stations in the United Kingdom.

The number of stations has gradually increased until at the end of March 1898 the total number was 149, including 16 belonging to the Royal Meteorological Society and 19 belonging to the Scottish Meteorological Society. Copies of these latter returns are sent to the Office under special arrangements with both Societies.

The Stations of the Second Order are distributed as follows: 45 in England, 3 in Wales, 25 in Scotland, and 10 in Ireland.

The methods followed with regard to the examination and publication of these returns have been fully detailed in previous reports, and need not now be repeated. The changes introduced into the volume for 1886 have been continued in those for later years. These refer to the barometer readings, which are now given at station-level instead of being reduced to the mean sea-level; and to the humidity, where the depression of wet bulb is shown, the international forms A and B being modified accordingly.

The volume of "Returns from Stations of the Second Order" for 1894 contained returns from 72 stations and that for 1895, now in the Press, also contains returns from 72 stations.

Arrangements have been made under which it is hoped that the arrears of this publication will be rapidly reduced.

Reports from the Irish stations are regularly supplied to the Registrar-General for Ireland for his Weekly and Quarterly Returns.

New stations.

When an application for the adoption of a new station is received, a schedule is forwarded to the observer containing a series of questions as to the outfit of the station, the exposure of the instruments, and the influence likely to be exerted on their indications by surrounding objects, such as houses and trees. Only mercurial barometers are

accepted, and only such as have been duly verified. All thermometers must have been tested at Kew. A plan of the station, showing the positions of the instruments with regard to neighbouring objects, is also required.

On the return of this schedule the answers are considered, and, where necessary, alterations are advised.

If, however, the existing arrangements are satisfactory, tables for reducing the barometer readings to 32° Fahrenheit at mean sea-level are prepared and duplicates sent to the observer, together with a set of Hygrometrical Tables, and a copy of "Instructions in the Use of Meteorological Instruments."

The first returns are compared and examined with special care, and a report of the result of the examination is forwarded to the observer, with instructions how best to improve and complete the returns.

There are still many parts of the British Islands very poorly represented by the existing stations; for instance, Wales, the northern coasts of Cornwall and Devon, Somersetshire, Essex, the south-east of Ireland, &c., and any information for these districts would be valuable.

VII.—*Land Stations of the Third Order.*

These are 66 in number. The information supplied from them is, in some cases, similar to that supplied by a station of the second order, but taken only once daily, or at irregular hours, or perhaps less complete. At other stations less detail is given; for instance, 36 stations furnish only the daily rainfall. All the information thus afforded is utilised in some way or other, though it is not all included in the Office publications. The rainfall values are copied and supplied to Mr. Symons, F.R.S., for publication in "British Rainfall."

Inspection.

The Stations of the Second Order are regularly inspected, the attention of the inspector being directed by the Office to any special point which may require investigation.

List of Stations.

In Appendix XI., page 88, is given a complete list of the stations supplying information to the Office.

APPENDIX XI.

List of Stations in the British Islands from which Information has been received at the Meteorological Office during the year ending March 31st, 1898.

The Stations marked "S" are in connexion with the Scottish Meteorological Society, and those marked "Rt" are in connexion with the Royal Meteorological Society. The returns from these Stations are received by the Office under an arrangement which will be found detailed in previous reports.

In certain cases where the actual station at which the Observations have been taken is not generally known, and could not be readily identified, the name of some village or town near has been inserted following the name of the station, within brackets.

The nature of the information received from each station is indicated by letters as follows:—

A. *Observatories.*—Continuous record of pressure, temperature, wind, sunshine and rain, with eye observations of the amount, form, and motion of the clouds, and notes on the weather.

B. *Anemographic Stations.*—Continuous record of the direction and velocity (or force) of the wind.

C. *Barographic Stations.*—Continuous record of pressure.

D. *Second Order Stations.*—Monthly sheets, containing the regular observations at 9 a.m. and 9 p.m. each day, local time, of pressure, temperature (dry bulb and wet bulb), wind, cloud, and weather, with the daily maxima and minima of temperature, the daily rainfall, and general remarks on the weather.

E. *Second Order Stations.*—Monthly means and summaries on Form B. of observations taken at 9 a.m. and 9 p.m., each day as above.

F. *Climatological Stations.*—The maximum and minimum temperature and the rainfall for each day, with remarks on the weather. This information is received in the Meteorological Office each week for use in the "Weekly Weather Report."

G. *Third Order Stations.*—Observations of the same kind as at Second Order Stations, but either:—

(*a*) less full.
(*b*) taken only once daily.
(*c*) Taken at hours other than 9 a.m. and 9 p.m.

R. *Rainfall Stations.*—Monthly sheets containing the daily observations of the amount of rainfall, with remarks on the weather.

S. *Sunshine Stations.*—Continuous record of bright sunshine.

T. *Telegraphic Stations.*—Regular observations at 8 a.m. and 6 p.m. G.M.T. (and from some stations at 2 p.m. in addition), of pressure, temperature, wind and weather, with the daily maxima and minima of temperature, the daily rainfall, and where possible, the sea-disturbance at 8 a.m. each day and the daily amount of bright sunshine. This information is received at the Meteorological Office each day by telegraph, for use in the "Daily Weather Report" and, as required, for use in the "Weekly Weather Report."

W. *Sea-temperature.*—Daily observations of the temperature of the sea water.

Station.	Lat.	Long.	Height in feet above M.S.L.	Observer.	Nature of Information supplied.	Page where Inspector's Report for 1897 will be found.
Aberdeen Observatory ..	57 10	2 6 W.	46	Prof. C. Niven ..	A. T. C.	49, 65
„ Cove Bay	57 9	2 5 „	—	Coastguard	W.	—
Adare, Limerick	52 33	8 46 „	—	The Earl of Dunraven.	R.	—
Alnwick Castle	55 25	1 43 „	210	Humphry Willyams, for the Duke of Northumberland.	B. F.	69, 70
Ardrossan, Ayrshire ..	55 38	4 50 „	15	J. W. Mayes	T.	50
Arlington Court, Barnstaple	51 8	3 58 „	613	Lady Chichester ..	F.	—
Armagh Observatory ..	54 21	6 39 „	196	J. L. E Dreyer ..	B.D.F.S.	63, 65
Arran, North, Galway ..	53 6	9 40 „	—	Coastguard	G. W.	—
Aspley Guise	52 1	0 38 „	410	E. E. Dymond ..	S.	—
Aysgarth Vicarage, Yorks.	54 18	1 58 „	646	Rev. F. W. Stow ..	D.	—
Bahama Bank Lightship ..	54 20	4 13 „	—	Light-keepers ..	W.	—
Ballantrae, Ayrshire ..	55 6	5 0 „	—	Coastguard	W.	—
Ballydonegan, Co. Cork ..	51 38	10 3 „	—	„	W.	—
Ballyglass, Co. Mayo ..	54 17	9 52 „	—	„	W.	—
Baltimore, Co. Cork	51 28	9 22 „	—	„	G.	—
Bantry	51 41	9 27 „	—	R. Brennan	R.	—
Belmullet, Co. Mayo ..	54 13	9 59 „	40	Miss E. Tolan ..	T.	45
Belvoir Castle, Grantham ..	52 54	0 47 „	259	W. H. Divers, for the Duke of Rutland.	D.	60
§ Ben Nevis	56 48	5 0 „	4,406	A. Rankin, for Directors Ben Nevis Observatory.	S. E.	—
Bennington, Herts.	51 54	0 5 „	407	Rev. J. D. Parker ..	E.	—
Berkhamsted	51 46	0 34 „	400	E. Mawley	E.	—
Bidston Observatory, Liverpool.	53 24	3 4 „	188	W. E. Plummer ..	D. T.	53
Birr Castle, Parsonstown ..	53 6	7 55 „	175	R. Jacob and T. Haines, for the Earl of Rosse.	D. S. T.	45
Blackpool	53 48	3 3 „	31	A. J. Anderson ..	F. S.	52
Blacksod Point, Co. Mayo ..	54 6	10 4 „	—	Coastguard	W.	—
Bolton, Chadwick Museum	53 35	2 27 „	389	W. W. Midgley ..	G.	—
Bournemouth	50 43	1 53 „	—	Messrs. Primavesi, for Town Council.	S.	—
§ Braemar	57 0	3 24 „	1,111	J. Aitken	D. F. S.	49
Bramley, Surrey	51 11	0 33 „	148	J. Bartlett	D.	52
Bray, Co. Wicklow	53 12	6 6 „	—	Coastguard	G.	—
Brighton	50 49	0 8 „	—	A. Newsholme ..	S.	—
Burnmouth, Ayton, Berwick	55 51	2 4 „	—	Coastguard	W.	—
Burntisland	56 4	3 14 „	—	„	W.	—
Buxton	53 14	1 54 „	987	E. A. Dent	E.	—
Caernarvon Bay Lightship	53 6	4 45 „	—	Light-keepers ..	W.	—
Cambridge	52 13	0 6 E.	88	Miss A. Walker ..	T. S.	—
Campden, Glos.	52 5	1 46 W.	524	Capt. W. Wright, R.A.	R.	57
Cardigan Bay Lightship ..	52 25	5 1 „	—	Light-keepers ..	W.	—
§ Cargen	55 2	3 37 „	72	A. Peacock	E.	—
Carrigallen, Co. Leitrim ..	53 58	7 38 „	? 350	Mrs. J. Godley and Miss Morrow.	R.	—
Castletownshend, Co. Cork	51 32	9 11 „	—	Coastguard	G.	—
Chatham	51 23	0 32 E.	136	The Instructor in Surveying.	G.	51
Cheadle	52 58	1 57 W.	646	J. C. Philips	E. F.	—
Cheltenham	51 54	2 3 „	184	R. Tyrer	E.	—
Chester	53 12	2 54 „	59	Rev. J. Cairns Mitchell.	D.	53
Churchill, Oxon	51 56	1 34 „	509	Giles Edmonds ..	R.	—
Churchstoke	52 31	3 5 „	538	P. Wright	D. F. S.	—
Cirencester	51 43	1 57 „	446	Prof. Ohm	F. S.	56, 57
Cleggan, Co. Galway ..	53 33	10 8 „	—	Coastguard	W.	—
Clifton	51 27	2 37 „	230	D. Rintoul	F.	56
Colly Weston	52 37	0 31 „	280	Miss A. Tasker ..	R.	—
Colwyn Bay	53 17	3 43 „	—	R. E. Lord	S.	52
Coningbeg Lightship ..	52 2	6 40 „	—	Light-keepers ..	W.	—
Cooper's Hill, Egham ..	51 26	0 34 „	279	Prof. H. McLeod ..	G.	—
Cromarty	57 41	4 0 „	—	Coastguard	W.	—
Cronkbourne (Douglas) ..	54 10	4 29 „	137	A. W. Moore	D. F. S.	—
Crookhaven	51 28	9 43 „	—	Coastguard	G.	—
Crosshaven	51 48	8 18 „	—	„	G.	—
Cuckfield, Sussex	51 1	0 9 „	389	John Howe	R.	51
Cullen	57 41	2 49	18	R. A. J. Glover ..	D.	—
Cullompton	50 51	3 23	202	T. Turner	F. S.	—
Currygrane (Edgeworthstown), Co. Longford.	53 45	7 39	267	J. M. Wilson	D. F.	—

	Station.	Lat.	Long.	Height in feet above M.S.L.	Observer.	Nature of Information supplied.	Page where Inspector's Report for 1897 will be found.
	Deerness, Orkney Islands..	58 56	2 45 W.	169	M. Spence	B. D. S.	66
	Disserth (Llandrindod) ..	52 13	3 24 „	711	Rev. J. Le Herbert..	R.	—
	Dolmelynllyn (Dolgelly) ..	52 47	3 53 „	—	W. Simmonds, for C. R. Williams.	R.	—
	Donaghadee	54 38	5 32 „	26	T. MacGowan ..	T.	44
	Doneraile, Co. Cork.. ..	52 13	8 34 „	266	Captain Evans ..	R.	—
	Dover, Waterworks.. .	51 7	1 18 E.	198	H. E. Stilgoe ..	R.	—
	Dublin, Botanic Gardens ..	53 23	6 16 W.	67	F. W. Moore.. ..	D.	45
	„ City	53 20	6 15 „	47	J. W. Moore	D. F.	—
	„ Mountjoy Obs., Phœnix Park.	53 22	6 21 „	155	Maj. R. C. Hellard, R.E	B. D. S.	62, 65
	Duddington	52 36	0 32 „	152	Fred Coventry ..	F.	—
S	Dundee	56 28	2 56 „	160	J. Carnochan ..	D. S.	49
	Dungeness	50 55	0 59 E.	26	W. Batten	T.	51
S	Dunrobin Castle	57 59	3 56 W.	12	D. Melville, for the Duke of Sutherland.	D.	49
	Durham..	54 46	1 35 „	336	H. J. Carpenter ..	D. F. S.	—
	Dursley (Farnley), Glos. ..	51 41	2 21 „	250	R. W. Pinney ..	R.	—
	Eastbourne	50 46	0 17 E.	33	R. Sheward	D. S.	51
	East Goodwin Lightship ..	51 13	1 36 „	—	Light-keepers ..	W.	—
	East Dereham	52 41	0 57 „	158	G. H. Cooper ..	R.	—
	Edgbaston (Birmingham)..	52 28	1 56 W.	534	Alf. Cresswell ..	D.	55
	Edinburgh	55 57	3 12 „	253	R. C. Mossman ..	D. S.	48
	English and Welsh Grounds Lightship.	51 27	3 0 „	—	Light-keepers ..	W.	—
	Ennis, Co. Clare	52 51	8 59 „	38	Miss A. L. Scott ..	R.	—
	Epsom, R. Med. College ..	51 20	0 14 „	271	H. E. Gardner ..	D.	51
	Falmouth	50 9	5 4 „	167	E. Kitto	A. F.	62, 65
	Fleetwood	53 56	3 1 „	—	M. S. Gaulter ..	B.	63
	Forgandenny, Perth ..	56 21	3 29 „	175	C. L. Wood	C.	—
S	Fort Augustus..	57 8	4 40 „	68	Rev. M. Wall ..	E. F. S.	—
	Fort William	56 48	5 6 „	31	A. Rankin, for Directors, Ben Nevis Observatory.	A. F.	67
	Foynes, Co. Limerick ..	52 37	9 7 „	108	Lord Monteagle ..	F.	—
	Fredville (Dover)	51 7	1 18 E.	173	H. W. Plumptre ..	R.	—
	Fulbeck, Lincolnshire ..	53 3	0 37 W.	185	Rev. Vere F. Willson	C. D.	60
	Geldeston (Beccles).. ..	52 28	1 31 E.	37	E. T. Dowson ..	D. F. S.	—
	Gilcrux (Maryport).. ..	54 44	3 23 W.	261	J. Monkhouse ..	D. F. S.	53
	Glasgow	55 53	4 18 „	180	Prof. L. Becker ..	A. D. F.	50, 66
S	Glencarron	57 30	5 14 „	489	D. D. Munro.. ..	E. F.	48
S	Glenlee	55 5	4 12 „	203	W. Melville	E. F.	—
S	Gordon Castle..	57 37	3 5 „	101	C. Webster, for the Duke of Richmond and Gordon, K.G.	E.	49
	Gorleston (Suffolk)	52 35	1 43 E.	—	R. J. C. Day	G.	—
	Guernsey (St. Peter's) ..	49 32	2 32 W.	—	F. E. Carey	S.	56
	Harpenden, Herts.	51 49	0 20 „	419	T. Wilson	G.	—
	Haslar Hospital, Hants. ..	50 47	1 7 „	—	R. Harring	G.	—
	Hawes Junction	54 19	2 18 „	1135	W. H. Bunce.. ..	G.	53
	Hesley Hall (Bawtry) ..	53 26	1 2 „	65	B. I. Whitaker ..	F.	60
R	Hereford	52 5	2 45 „	274	T. A. Chapman ..	F.	—
	Heysham Hall, Lancashire	54 3	2 54 „	95	S. Lomas, for Miss L. Graiton.	D.	53
R	Hillington	52 48	0 33 E.	88	Rev. H. E. B. Ffolkes	D. F. S.	—
	Hollesley Bay..	52 3	1 27 „	38	Prof. C. G. F. Thonger.	D. S.	60
	Holyhead, Harbour Office..	53 18	4 39 W.	57	F. M. Cotton ..	B. W.	72
	„ Sailors' Home ..	53 18	4 39 „	48	T. Chope	T.	53
	Hurdlestown, Broadford, Co. Clare.	52 48	8 38 „	157	Lieut.-Col. W. O. Bentley, R.A.	R.	—
	Hurst Castle	50 42	1 33 „	12	E. T. Tremble ..	T.	56
	Kearsney Abbey, Dover ..	51 8	1 17 E.	? 100	C. W. Curtis .. .	R.	—
	Ketton, Stamford	52 38	0 32 W.	—	G. Drabble	R.	—
	Kew Observatory	51 28	0 19 „	18	C. Chree	A.	—
	Kilcredane, Co. Clare ..	52 35	9 47 „	—	Coastguard	W.	—
	Kilkenny	52 39	7 14 „	212	H. Carlton, for the Marquis of Ormonde.	C. F.	45

Station.	Lat.	Long.	Height in feet above M.S.L.	Observer.	Nature of Information supplied.	Page where Inspector's Report for 1897 will be found.
	° ′	° ′				
Killarney	52 4	9 30 W.	86	Ven. Archdeacon Wynne.	G. F.	—
Killiney (Cloneevin), Co. Dublin.	53 16	6 7 „	249	R. O'Brien Furlong	R.	—
Kirkwall	58 59	2 57 „	—	Coastguard	W.	—
Kish Bank Lightship ..	53 19	5 55 „	—	Light-keepers ..	W.	—
Ladylaw (Hawick)	55 28	2 47 „	447	T. Wilson	D.	—
Lahinch	52 55	9 21 „	52	Miss J. Bowes ..	R.	—
Lairg	58 1	4 22 „	335	Rev. D. Macrae ..	E. F.	49
Lamlash, Isle of Arran, Scotland.	55 32	5 8 „	—	Coastguard	W.	—
Laudale, Argyleshire ..	56 41	5 41 „	14	A. Fletcher, for T. H. G. Newton.	D. F.	—
Lednathie	56 45	3 7 „	719	W. Morrison, for J. Stormonth Darling.	E.	49
Leith	55 58	3 10 „	20	T. Richardson ..	T.	49
Leman and Ower Lightship	53 8	2 2 E.	—	Light-keepers ..	W.	—
Lerwick	60 9	1 8 W.	—	Coastguard	W.	—
Limerick	52 39	8 36 „	—	A. W. Shaw	R.	—
Liscannor, Co. Clare ..	52 56	9 23 „	—	Coastguard	W.	—
Lissan, Co. Tyrone	54 41	6 45 „	300	Sir N. Staples, Bt. ..	E.	44
Llandinam, Montgomery ..	52 29	3 26 „	500	John Owens ..	R.	—
Llandovery	51 59	3 48 „	217	J. Watkins	F.	45
Llandudno	53 21	3 50 „	88	J. Nicol	E. F.	52
„	53 21	3 51 „	?20	Wm. Little	S.	—
London, Brixton	51 29	0 7 „	77	F. Gaster	T.	—
„ City	51 32	0 5 „	80	Messrs. de la Rue ..	S.	—
„ Pall Mall	51 32	0 8 „	—	Athenæum Club ..	C.	—
„ Westminster ..	51 31	0 8 „	76	The Staff of the Met. Office.	C.G.	—
„ Westminister Training College.	51 31	0 8 „	—	H. A. Reatchlous ..	S.	-
Londonderry	55 0	7 19 „	67	J. Conroy	D. F.	44
Loughborough	52 47	1 12 „	169	W. Berridge	T.	—
Lowestoft	52 29	1 44 E.	—	J. Moore	G.	—
Lowestoft	52 29	1 44 „	85	S. H. Miller	E.	—
Malin Head, Co. Donegal ..	55 23	7 24 W.	230	J. Williams	T. C.	44
Manchester	53 29	2 13 „	190	J. Niven	D.	53
Marchmont	55 44	2 25 „	428	J. A. Wood	E. F. S.	—
Margate	51 24	1 24 E.	83	J. Stokes	S.	—
Market Rasen	53 23	0 20 W.	83	W. B. Jevons ..	R.	61
Markree Castle, Co. Sligo ..	54 11	8 27 „	122	Miss E. Reynolds, for Col. Cooper.	D. F. S.	44
Minard, Co. Kerry	52 7	10 8 „	—	Coastguard	W.	—
Morpeth	55 13	1 41 „	324	G. P. Berry	D. S.	59
Mount Callan (Inagh), Co. Clare.	52 53	9 16 „	479	Lt.-Col. Tottenham	R.	—
Nairn	57 36	3 52 „	84	Miss Penny	T.	49
Newcastle, Co. Wicklow ..	53 5	6 6 „	256	B. H. Steede	D.	45
Newcastle-on-Tyne ..	54 59	1 36 „	152	N. H. Martin ..	G. S.	59
Newarp Lightship	52 45	1 53 E.	—	Light-keepers ..	W.	—
Newport, Monmouth ..	51 35	3 0 W.	—	C. Cullum	R.	—
Newquay, Cornwall ..	50 25	5 4 „	?250	J. Pearce	S.	—
„ ..	50 25	5 5 „	—	Coastguard	W.	—
Northallerton	54 20	1 26 „	129	W. Stead	R.	—
North Foreland	51 23	1 27 E.	115	S. Jenkins	T.	50
North-West Lightship, Liverpool.	53 31	3 31 W.	—	Light-keepers ..	W.	—
Norwood	51 26	0 6 „	220	W. Marriott	E.	—
Ochtertyre	56 23	3 53 „	329	G. Croucher, for Sir P. K. Murray, Bt.	E. F.	48
Omagh (Edenfel)	54 36	7 19 „	300	Col. Buchanan ..	F.	—
Oswaldkirk, Yorkshire ..	54 12	1 3 „	—	R. Thompson ..	S.	—
Outer Dowsing Lightship	53 27	1 5 E.	—	Light-keepers ..	W.	—
Owers Lightship	50 39	0 41 W.	—	„	W.	—
Oxford	51 46	1 16 „	208	W. Wickham ..	T. S.	71
Parkstone, Dorset	50 43	1 56 „	197	R. H. Barnes ..	D.	—
Penbedw, Mold	53 12	3 11 „	650	H. W. Buddicom ..	C.	—
Pennant Bay, Aberdour ..	57 40	2 16 „	—	Coastguard	W.	—

	Station.	Lat.	Long.	Height in feet above M.S.L.	Observer.	Nature of Information supplied.	Page where Inspector's Report for 1897 will be found.
S	Pinmore, Girvan	° ′ 55 12	° ′ 4 49 W.	187	P. Donald, for Capt. Hamilton.	E.	50
	Plumstead	51 29	0 6 E.	—	J. G. Waller	S.	—
	Plymouth, The Hoe	50 22	4 8 W.	116	H. Victor Prigg ..	D. F. S.	55, 56, 57
	" Freedom Fields	50 24	4 8 "	207	" ..	R.	57
S	Poltalloch	56 8	5 30 "	132	J. Russell, for Lord Malcolm.	E.	—
	Portrush	55 13	6 40 "	—	Coastguard	W.	—
	Port Talbot	51 34	3 45 "	—	J. Hollingworth, for Miss Talbot.	S.	—
	Prawle Point	50 12	3 43 "	332	M. Howse	T.	55
	Prestwich (Manchester) ..	53 32	2 17 "	320	T. R. H. Clunn ..	D. F. S.	53
	Rede Court (Rochester) ..	51 24	0 29 E.	224	W. H. Tingey ..	D.	51
	Roche's Point, Co. Cork ..	51 47	8 19 W.	42	W. Kennedy ..	T.	45
	Rochford, Tenbury	52 18	2 36 "	316	Rev. John Tomson	C. R.	—
S	Rosewell	55 51	3 7 "	690	R. W. D. Cameron ..	E.	—
	Rothamsted	51 48	0 22 "	368	Sir J. B. Lawes and Sir J. H. Gilbert.	F. S.	—
S	Rothesay	55 50	5 4 "	115	J. Kay	E.	—
M	Rounton, Yorkshire ..	54 24	1 18 "	249	Sir I. L. Bell, Bart. ..	E.	—
M	Rousdon, Devon	50 43	3 0 "	515	C. E. Peek	E.	—
	Roxborough, Co. Limerick	52 35	8 36 "	111	A. W. Shaw	R.	—
	Royal Sovereign Lightship	50 43	0 27 E.		Light-keepers ..	W.	—
	Rugby	52 22	1 15 W.	379	E. Kitchener ..	G.	55
	St. Ann's Head, Pembroke	51 41	5 11 "	150	H. T. Knott	T. S. W.	45
	St Aubin's, Jersey	49 12	2 11 "	25	J. Fisher	T.	55
	St. David's, Pembrokeshire	51 53	5 16 "	215	W. P. Propert ..	D.	—
	St. Helen's, Lancashire ..	53 28	2 45 "	151	F. Drew Harris ..	G.	53
	St. Helier's, Jersey	49 11	2 6 "	—	Signal Officer, Fort Regent.	S.	56
	St. Leonard's	50 51	0 33 E.	171	H. Colborne	D. F. S.	51
	" (West Marina)	50 51	0 32 "	—	T. Eldridge	G.	—
	Salcombe, Devon	50 14	3 46 W.	—	Coastguard	W.	—
	Sandgate, Kent	51 4	1 9 E.	56	A. Robert Bowles ..	R.	—
M	Scarborough	54 17	0 23 W.	159	E. W. Ellerbeck ..	D. F. S.	—
	"	54 17	0 23 "	—	Coastguard	W.	—
	Schull	51 32	9 32 "	—	"	G.	—
	Scilly Islands, St. Mary's ..	49 56	6 18 "	80	A. Hicks	B. S. T. W. C.	61, 64
	Seafield, Miltown Malbay, Co. Clare.	52 48	9 30 "	—	Coastguard	W.	—
	Seaham Harbour	54 50	1 19 "	148	G. H. Aird	D.	—
	Sedbergh	54 19	2 32 "	400	Miss Burra	R.	—
	Seven Stones Lightship ..	50 4	6 5 "	—	Light-keepers ..	W.	—
M	Shaftesbury	51 1	2 12 "	—	Miss L. Waud ..	F.	—
	Shambles Lightship ..	50 31	2 20 "	—	Light-keepers ..	W.	—
	Sheffield	53 23	1 29 "	429	E. Howarth	D. S.	—
	Sheephaven (Dunfanaghy)	55 11	7 58 "	—	Coastguard	W.	—
	Shields, North	55 0	1 27 "	97	W. B. Clark	T.	70
	Shields, North, High Lighthouse.	55 0	1 27 "	—	Captain Harrison ..	B.	69
	Shipwash Lightship ..	52 2	1 38 E.	—	Light-keepers ..	W.	—
	Shirley, near Birmingham	52 25	1 49 W.	460	B. Boothroyd ..	F.	57
	Skipton	53 58	2 9 "	567	W. Ecroyd	G.	53
	Solway Lightship	54 48	3 32 "	—	Light-keepers ..	W.	—
	Southampton	50 55	1 24 "	78	J. T. Cook, for Dir. Gen. of Ordnance Survey.	D. F. S.	56
	Southport	53 39	2 59 "	—	J. Baxendell	S.	52
	South Rock Lightship ..	54 25	5 22 "	—	Light-keepers ..	W.	—
	Spidall, Co. Galway	53 15	9 17 "	—	Coastguard	G.	—
	Spurn Head	53 34	0 7 E.	19	G. Freeman	T.	59
	Spurn Lightship	53 34	0 13 "	—	Light-keepers ..	W.	—
	Stokesay, Craven Arms ..	52 26	2 52 W.	370	Miss M. A. Digges La Touche.	D.	—
	Stonyhurst College	53 51	2 28 "	375	Rev. W. Sidgreaves	A. D. F.	64, 65
	Stornoway	58 11	6 22 "	28	J. Mackenzie ..	T. S. C.	48
	"	58 11	6 22 "	—	Coastguard	W.	—
	Stranraer	54 54	5 2 "	—	"	G.	—
	Strathpeffer-Spa, N.B. ..	57 37	4 28 "	253	J. Tregelles Fox ..	D. S.	—
	Sumburgh Head (Shetlands).	59 51	1 17 "	126	Rev. W. Brand ..	T. C.	—
	Sunderland	54 54	1 23 "	—	Coastguard	W.	—
	Symbister, Shetlands ..	60 14	1 25 "	—	J. S. Nicolson ..	G.	—
	Syston, Leicester	52 43	1 5 "	178	S. K. Daniels ..	R.	—

Station.	Lat.	Long.	Height in feet above M.S.L.	Observer.	Nature of Information supplied.	Page where Inspector's Report for 1897 will be found.
Tavistock	° ′ 50 33	° ′ 4 8 W.	391	E. E. Glyde	D.	—
Tealby, Lincolnshire ..	53 24	0 16 „	251	Rev. S. Lewin ..	D.	60
Teelin, Co. Donegal	54 38	8 39 „	—	Coastguard	W.	—
Tenby	51 41	4 42 „	79	W. T. Balmer ..	D. S.	46
Thurcaston, Leicester ..	52 42	1 10 „	263	Rev. T. A. Preston..	S.	—
Torquay..	50 28	3 31 „	—	A. Chandler	S.	—
Totland Bay, Isle of Wight	50 41	1 33 „	84	J. Dover	G.	57
Union Hall, Co. Cork ..	51 33	9 8 „	—	Coastguard	G.	—
Uppingham	52 35	0 44 „	484	Rev. G. H. Mullins..	D.	—
Uzon (Montrose)	56 40	2 28 „	—	Coastguard	W.	—
Valencia Observatory, Cahirciveen.	51 56	10 15 „	30	J. E. Cullum.. ..	A. T. C.	45, 63
„ Island, Glanleam	51 56	10 20 „	—	Miss E. FitzGerald	R.	—
„ Knightstown ..	51 55	10 20 „	—	Coastguard	G.	—
Ventnor	50 36	1 13 „	80	Miss M. Gibson ..	S.	56
Wakefield	53 41	1 30 „	96	H. Clarke	E.	—
Waterford	52 16	7 7 „	—	Harbour Authorities	C.	—
Watergate (Emsworth) ..	50 56	0 55 „	—	R. Christy	S.	—
Wealdstone	51 37	0 20 „	179	G. E. Eland	R.	—
Westbourne, Sussex.. ..	50 52	0 55 „	—	Rev. L. B. Birkett ..	S.	—
Westray, Orkney	59 17	3 0 „	—	J. Hewison	G.	—
Wick	58 27	3 6 „	80	J. Sinclair	T.	49
„	58 27	3 6 „	—	Coastguard	W.	—
Wolfiee	55 23	2 39 „	587	W. Cockburn ..	D.	—
Woolacombe	51 10	4 12 „	59	E. Henshall	D.	—
Worksop	53 18	1 8 „	—	H. Mellish	S.	—
Yarmouth	52 37	1 43 E.	10	G. T. Watson ..	B. T. C.	69, 71
„ Isle of Wight ..	50 42	1 29 W.	—	Coastguard	G.	—
Ynis-y-bro, Newport ..	51 38	3 3 „	115	C. Cullum	R.	—
York, Bootham	53 57	1 5 „	—	E. B. Collimon ..	S.	—
„ The Museum	53 57	1 5 „	56	H. M. Platnauer ..	D. T.	59, 60

In addition to those already mentioned, reports are received daily from the following Continental Stations.

Station.	Authority.	Station.	Authority.
Haparanda	Meteorological Office, Stockholm.	†The Helder	Bureau Centra Météorologique Paris.
Hernösand		Brussels	
†Stockholm		Cape Gris Nez	
Wisby		†Brest (St. Mathieu) ..	
Karlstad		Lorient (Île de Groix)..	
		*†Rochefort (Ile d'Aix)..	
Bodö	Meteorological Institute, Christiania.	†Biarritz	
†Christiansund		†Paris	
*†Skudesnaes		Belfort	
Færder		Lyons	
		Nice	
†The Scaw	Meteorological Institute, Copenhagen.	Perpignan	
Faaö		Berlin	Cent. Met. Inst. of Germany.
Cuxhaven..	Deutsche Seewarte, Hamburg.	Wiesbaden	
		Munich	
		Corunna	Observatory, Lisbon.
		†Lisbon	
		Azores (P. Delgada) ..	

Note—The stations marked with an asterisk (*) report also at 2h. p.m., and those with dagger (†) at 6h. p.m.: Lisbon reports at 4h. p.m. instead of 6h. p.m.
The Helder does not send reports at 6 p.m. on Sundays.

APPENDIX XII.

List of Documents received from Foreign Land Stations during the year ending March 31st, 1898.

Place.	Observer.	Nature of Observations.
Antigua	Francis Watts	Observations twice daily, 1897, March to December; 1898, January, February.
Bahamas (Abaco)	Lightkeepers...	Lighthouse Register, 1897, January to December.
„ (Cat Cay)	A. S. Haigh	Barometer diagrams, 1897, March to May, November, December; 1898, January, February.
„ (Cay Lobos)	Lightkeeper	Lighthouse Register, 1897, January to December.
„ (Cay Sal)	„	„ „ „ „ „
„ (Inagua)	„	„ „ „ „ „
„ (Nassau)	J. A. Kerr	Observations once daily, 1897, March to December; 1898, January.
„ (Watling Island) ...	Lightkeeper	Lighthouse Register, 1897, January to December.
Barbados	J. R. Bovell	Monthly summary of observations twice daily, 1897, March to December; 1898, January.
Beyrout (Lee Observatory) ...	R. H. West, M.A.	Observations twice daily, 1897, March to December; 1898, January, February.
Cape Pembroke(Falkland Islands)	G. K. Broom, Lightkeeper	Lighthouse Register, 1897, January to December.
Cape Spartel (Tangier)	E. C. Hathaway and J. J. Emmott, Lloyd's Signalmen.	Observations twice daily, 1897, March to December; 1898, January, February.
Colon, Isthmus of Panama ...	Rev. S. P. Hendrick	Observations twice daily, 1897, October to December; 1898 January, February.
Cyprus (Famagusta)	G. Eliades	Observations twice daily, 1897, January to December.
„ (Kyrenia)	P. Michaelides	„ „ „ „ „ „
„ (Larnaca)	C. Perini	„ „ „ „ „ „
„ (Limassol)	Luigi Béraud	„ „ „ „ „ „
„ (Nicosia)	E. Ioannides	„ „ „ „ „ „
„ (Papho)	E. A. Malliotis and M. Theodorides	„ „ „ „ „ „
Ebolewode, West Africa	A. L. Bennett, M.D....	Daily observations of maximum and minimum temperature, 1897, October, November.

George Town (British Guiana)...	Robert Ward...	Observations twice daily, 1897, March to December.
" " " " ...	" "	Daily record of sunshine, 1897, March to December.
Gibraltar	Sergeant A.W. Harwood, Med. Staff Corps.	Observations twice daily, 1897, March to December; 1898, January, February.
Gold Coast (Aburi)	Assistant Colonial Surgeons ...	Observations twice daily, 1897, March to December.
" " (Accra)	" " " ...	" " " " " "
" " (Adda)	" " " ...	" " " " February to December.
" " (Axim)	" " " ...	" " " " " November.
" " (Cape Coast Castle)	" " " ...	" " " " March to December.
" " (Kwitta)	" " " ...	" " " " " "
Lagos	T.B. Wright and J. T. C. Robbin ...	" " " " " " ; 1898, January.
Mojanga (Madagascar)	S. C. Knott	" " " " February to December.
Namirembe, Mengo, Uganda ...	Rev. A. J. Pike	" once daily; 1897, January to December (except October).
St. Helena	H. S. Hands	Observations once daily, 1897, March to December.
"	"	Continuous record of wind (direction and velocity), 1897, March to December.
" (James Town) ...	P. Clifford and A. E. Broadway ...	Daily rainfall, 1897, March to December.
" (Mount Pleasant) ...	T. C. Barker	" " " " "
St. Lucia (Morne Fortuné) ...	Unknown	Monthly results of observations, 1885–1887; 1890–1895.
Sierra Leone	Z. Grant	Observations twice daily, 1897, March to December; 1898, January, February.
Sombrero	J. A. Richardson and A. L. Richardson.	Lighthouse Register, 1896, October to December; 1897, January to March.
Soulina	Unknown	Monthly means of observations for 1896.
Teneriffe (Sitio de Cullen) ...	A. F. Perry	Observations twice daily, 1897, March to December; 1898, January, February.
" " " ...	"	Continuous record of pressure, 1897–1898.
" " " ...	"	" " temperature, 1897–1898.
Trinidad	J. H. Hart, Supt. Botanic Gardens	Observations twice daily, 1897, January to December.
"	" " " "	Daily record of sunshine, 1897, January to December.

APPENDIX XIII.

ADDITIONS TO THE LIBRARY DURING THE YEAR ENDING 31ST MARCH, 1898.

Aachen, Meteorologische Station.—Deutsches meteorologisches Jahrbuch für 1896. Meteorologische Station I. Ordnung in Aachen. Ergebnisse der meteorologischen Beobachtungen. Herausgegeben . . . von P. Polis. Jahrg. 2. la. 4°. Karlsruhe, 1897.

——— ——— Ergebnisse der 1897 in Aachen von der meteorologischen Station Aachen des Königl. Preuss. Meteorologischen Instituts angestellten Beobachtungen. sm. f°. Sheet.

Abbadie, Antoine d'.—Observations relatives à la physique du Globe faites au Brésil et en Ethiopie par Antoine d'Abbadie. Rédigées par R. Radau. la. 4°. Paris, 1883.

Abercromby, Hon. R.—Instructions for observing clouds on land and sea, with photographs and engravings. 8°. London, 1888.

‖ ——— The peculiar sunrise-shadows of Adam's Peak in Ceylon. Read before the Physical Soc. on Nov. 13, 1886. 8°. (*Phil. Mag.*, 1887, *Jan.*, *p.* 29.)

‖ ——— Observations on the height, length, and velocity of ocean waves. Read before the Physical Soc. on Feb. 25, 1888. 8°. (*Phil. Mag.*, 1888, *Apl.*, *p.* 263.)

‖ ——— On the heat and damp which accompany cyclones. la. 8°. (*Quart. Journ. Meteor. Soc.*, 1875, *Jan.*, *p.* 274.)

‖ ——— On certain small oscillations of the barometer. la. 8°. (*Quart. Journ. Meteor. Soc.*, 1875, *Oct.*, *p.* 435.)

‖ ——— On the barometric fluctuations in squalls and thunderstorms. la. 8°. (*Quart. Journ. Meteor. Soc.*, 1875, *p.* 450.)

‖ ——— On an improvement in aneroid barometers. la. 8°. (*Quart. Journ. Meteor. Soc.*, 1876, *Apl.*, *p.* 87.)

‖ ——— On certain types of British weather. Read Nov. 15, 1882. la. 8°. (*Quart. Journ. Meteor. Soc.*, 9, *p.* 1.)

‖ ——— On the diurnal variation of wind and weather in their relation to isobaric lines. la. 8°. (*Quart. Journ. Meteor. Soc.*, 1882, *Oct.*, *p.* 213.)

‖ ——— On the reduction of wind records. Read June 20, 1883. la. 8°. (*Quart. Journ. Meteor. Soc.*, 9, *p.* 226.)

‖ ——— On the explanation of certain weather prognostics. la. 8°. (*Quart. Journ. R. Meteor. Soc.*, 10, 1884, *p.* 26)

‖ ——— On the origin and course of the squall which capsized H.M.S. "Eurydice," March 24th, 1878. la. 8°. (*Quart. Journ. R. Meteor. Soc.*, 10, 1884, *p.* 172.)

‖ ——— On the physical significance of concave and convex barographic or thermographic traces. la. 8°. (*Quart. Journ. R. Meteor. Soc.*, 10, 1884, *p.* 241.)

‖ ——— On the cloud to which the name of "Roll Cumulus" has been applied. la. 8°. (*Quart. Journ. R. Meteor. Soc.*, 13, 1887, *Apl.*)

‖ ——— On the identity of cloud forms all over the world; and on the general principles by which their indications must be read. la. 8°. (*Quart. Journ. R. Meteor. Soc.*, 13, 1887, *p.* 140.)

NOTE.—Books marked * have been acquired by purchase; the others are donations from institutions, societies, or authors. Those marked ‖ are excerpt papers, extra copies of which have been separately printed.

In some cases additional publications have been received besides those specified, but only completed volumes or years are given here.

‖ **Abercromby, Hon. R.**—Electrical and meteorological observations on the Peak of Teneriffe. la. 8°. (*Quart. Journ. R. Meteor. Soc.*, 14, 1888, *p.* 101.)

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‖ ——— **K. K. Sternwarte.**—Meteorologische Beobachtungen auf der k. k. Sternwarte in den Jahren 1889–1894. 3 vols. la. 4°. Wien, 1894, 1896. (*Ann. Wien. Sternwarte, Bd.* 10–12.)

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‖ **Washington, Department of Agriculture, Weather Bureau.**—W.B. No. 122. A monograph on the mechanics and equilibrium of kites. Prepared . . . by C. F. Marvin. 1a. 8°. Washington, 1897. (*Monthly Weather Rev.*, 1897, *Apl.*)

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——— ——— Pilot charts of the North Pacific. 1897. Jan.-Dec. Charts 1a. f°.

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——— ——— Smithsonian miscellaneous collections. Vol. 35. 1a. 8°. Washington, 1897.

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‖ ——— **Meteorological Office.**—Rainfall. 1897, Jan.-Dec. sm. f°. Sheets. (*New Zealand Gazette.*)

‖ ——— ——— Return of rainfall (in inches) for each year from 1864 to 1896 inclusive. 2 sheets, sm. f°. (*New Zealand Gazette, Feb.* 10, 1898.)

* **Wenley, W. G.**—Proposed revolution in the science of meteorology. sm. 8°. Chelmsford, [1898].

* **Wetter, Das.**—Meteorologische Monatsschrift für Gebildete aller Stände. Herausgegeben von R. Assmann. 14 Jahrg., 1897. 1a. 8°. Berlin, 1897.

* **(Whitmore, C. A.)**—English weather. 1a. 8°. (*Nat. Rev.*, xxix., 1897, *May*, *p.* 421.)

‖ **Wild, H.**—Über die Differenzen der Bodentemperaturen mit und ohne Vegetations- resp. Schneedecke nach den Beobachtungen im Konstantinowschen Observatorium zu Pawlowsk. 1a. 4°. St. Pétersbourg, 1897. (*Mém. Acad. Imp. Sc. St. Pétersb.*, 8°. *sér.*, *Cl. phys. math.* v., *No.* 8.)

‖ ——— Verbesserter Ombrograph und Atmograph. sm. f°. (*Bull. Acad. Imp. Sc. St. Pétersb.*, v., 1896, *p.* 357.)

* **Wilson, E. M.**—Notes on malaria in connection with meteorological conditions at Sierra Leone. 8°. London, 1897.

Wise, A. T.—Meteorological observations taken in the Maloja during the winter of 1883–84. 8°. s.l.e.a.

‖ **Wollny, E.**—Untersuchungen über die Temperaturverhältnisse der Bodenarten. (Erste Mittheilung.) 8°. (*Forschungen auf dem Geb. Agrik.-phys.*, *Heidelberg*, 19, *Heft* 4–5.)

——— Untersuchungen über das Verhalten der atmosphärischen Niederschläge zur Pflanze und zum Boden. 9. Der direkte Einfluss der atmosphärischen Niederschläge auf die Pflanze. 8°. (*Forschungen auf dem Geb. Agrik.-phys.*, *Heidelberg*, 20, *Heft* 1.)

‖ ——— Untersuchungen über die Temperaturverhältnisse der Bodenarten (Zweite Mittheilung). 8°. (*Forschungen auf dem Geb. Agrik.-phys.*, *Heidelberg*, 20, *Heft* 2.)

‖ **Wollny, E.**—Untersuchungen über das Verhalten der atmosphärischen Niederschläge zur Pflanze und zum Boden. 10. Die künstliche Beeinflussung der Wirkungen der atmosphärischen Niederschläge. 8°. (*Forschungen auf dem Geb. Agrik.-phys., Heidelberg*, 20, *Heft* 3.)

Wragge, C. L.—An observatory on Mount Wellington. f°. (*Tasmanian Mail*, 1895, *May* 25.)

York, Yorkshire Philosophical Society.—Annual report . . . for 1896. la. 8°. York, 1897.

Zi-ka-wei, Observatoire Magnétique et Météorologique.—Bulletin mensuel. Tome 21. Année 1895. sm. f°. Chang-hai, 1897.

——— **Observatory.**—The "Iltis" typhoon, July 22–25, 1896. By the Rev. L. Froc. sm. f°. Zi-ka-wei, 1896.

Zürich, Schweizerische Meteorologische Central-Anstalt.—Annalen. 1895. "Der Schweiz. meteor. Beob." 32. Jahrg. 4°. Zürich, s.a.

——— ——— Wetterbericht. 1897, Jan. 1–Dec. 31. sm. f°. Sheets.

APPENDIX XIV.

ACCOUNT of RECEIPTS and PAYMENTS for the year ending 31st March, 1898:—

RECEIPTS.	£	s.	d.	PAYMENTS.	£	s.	d.	£	s.	d.
Balance from year 1896–97	1,429	5	3	ADMINISTRATION:						
Parliamentary Vote ...	15,300	0	0	Council...	968	9	5			
Repayment of expenses charged under—				Secretary	800	0	0			
				Salaries and wages ...	990	1	3			
	£	s.	d.	Rent, fuel, and lighting	712	9	4			
(1.) Incidental expenses ...	12	8	4	Incidental and contingent expenses ...	239	17	10			
(2.) Observatories ...	37	5	11	Furniture and fittings	96	18	1			
(3.) Inspections	0	19	0	Pensions	144	0	0			
	50	13	3					3,951	15	11
SUPPLY OF INFORMATION:				SPECIAL RESEARCHES:						
Daily Weather Charts and Forecasts ...	263	16	11	Salaries and other charges	...			782	12	9
6 p.m. Charts ...	25	0	0							
Reports for Press Agencies, &c.	103	0	5	LAND METEOROLOGY:						
Telegrams sent abroad... ...	143	3	11	Observatories and stations, including remuneration of observers	2,273	12	2			
	535	1	3	Salaries :—Discussion and reduction of observations, &c. ...	1,344	14	10			
								3,618	7	0
SALE OF INSTRUMENTS, &C.:				WEATHER INFORMATION AND FORECASTS:						
Royal Navy account ...	29	18	3	Telegraphic reports and storm warnings, remuneration of observers, &c.	2,634	18	5			
Mercantile Marine account ...	120	17	6	Salaries :—Preparation and issue of reports and forecasts ...	1,886	3	1			
"M.O." (Stations) account	42	6	9					4,521	1	6
	193	2	6	INSPECTIONS:						
				Salaries and travelling expenses	...			404	4	11
Repayment of miscellaneous Commissions executed for Colonial and Foreign institutions, &c.	149	0	8	OCEAN METEOROLOGY:						
				Salaries :—Discussion and reduction of observations ...	1,408	10	1			
Commission charged on work done for Colonies, &c. ...	10	16	0	Expenses incidental to the supply of instruments :—						
				Proportion for care and issue of instruments ...	398	6	8			
				Royal Navy ...	249	18	1			
				Mercantile Marine	368	8	3			
				Distant island and coast stations ...	10	0	0			
								2,435	3	1
				Miscellaneous commissions executed for Colonial and Foreign institutions, &c. ...	...			199	4	7
				BALANCE:						
				Cash at Bank ...	1,686	17	9			
				,, at Office	53	11	5			
				Advance for travelling expenses	15	0	0			
								1,755	9	2
£	17,667	18	11				£	17,667	18	11

In the year 1897–98 the sum of 1,613*l.* 10*s.* 6*d.* was paid to the Post Office on account of inland and foreign telegrams, allowances to telegraph clerks, rental of private wires, &c.

APPENDIX XV.

List of the Principal Papers printed in various Reports Issued by the Office from the Year 1866.

I.—Daily Weather Report.

Year.	Page.	——
1896 (July to Dec.).	1	Mean Values of Barometric Pressure for each Month and for the Whole Year, derived from Observations made at 8 a.m. daily during the 25 Years 1871–95.
1896	2 and 3	Mean Values of the Dry Bulb and Wet Bulb Temperatures for ditto, ditto.
„	4 and 5	Mean Values of the Daily Maximum and Minimum Temperatures, and of the Maximum and Minimum combined, for the 25 Years 1871–95.
„	6 and 7	Extremes of the Daily Maximum and Minimum Temperatures for ditto, ditto.
„	8	Mean Rainfall for each Month and for the Whole Year—derived from Observations extending over the 30 Years 1866–95.
„	9	Mean Numbers of Hours of Bright Sunshine, with the Percentages of Possible Duration, derived from Observations extending over the 15 Years 1881-95.

II.—Weekly Weather Report.

Year.	Page.	——
1884	V.	Table A.—Showing for each Degree of Latitude, from 49° N. to 58° N. the Total Number of Hours during which the Sun is above the Horizon, in each Month of the Four Quarters of the Year.
„	VI.	Table B.—Showing similar information for each Week of the Year.
1889	[1–9]	Summaries of Rainfall and Mean Temperature, for the First, Second, Third, and Fourth Quarters, and for the Whole Year, during the 24 Years 1866 to 1889. [Contains Separate Yearly Values from the year 1866.]
1895	VI.–VII.	Mean Values of the Daily Maximum and Minimum Temperatures, and of the Maximum and Minimum combined, for each Month and for the Whole Year, derived from Observations extending over the 25 Years 1871–95.
„	VIII.	Mean Rainfall for each Month and for the Whole Year, derived from Observations extending over the 30 Years 1866–95.

Year.	Page.	——
1895	IX.	Mean Numbers of Hours of Bright Sunshine, together with the Per-centages of the Possible Duration, for each Month and the Whole Year, derived from Records extending over the 15 Years 1881–95. [For separate Yearly Values for 1866-89, *see* 1889 [1-9].]
,,	[17]	Table I.—Showing for each District, during each of the Three Lustra, and tho whole Period comprehended in the 15 Years 1881–95, the Mean Aggregate numbers of rainy days from the beginning of the Year to the end of each week in the Year.
,,	[23]	Table II.—Showing in the same detail the Mean Aggregate Amounts of Rainfall.
,,	[27]	Table III.—Showing in the same detail the Mean Aggregate Values for Accumulated Heat above 42° F.
,,	[32]	Table IV.—Showing in the same detail the Mean Aggregate Values for Accumulated Heat below 42° F.
,,	[37]	Table V.—Showing in the same detail the Mean Aggregate Numbers of Hours of Bright Sunshine.
,,	[42]	Table VI.—Showing in the same detail the Mean Per-centages of the possible amount of Bright Sunshine.
,,	[47]	Table showing in Degrees Fahrenheit for each District, during each of the Three Lustra, and the whole Period comprehended in the 15 Years 1881–95, the Mean Temperature of the Air, for each week in the Year.
1897	[1-9]	Summaries of Rainfall and Mean Temperature for the First, Second, Third, and Fourth Quarters, and for the Whole Year, during the 32 Years 1866–97. [For the separate Yearly Values for 1866–89, *see* 1889 [1–9].] (p. 123.)

III.—Monthly Weather Report.

Year.	Page.	——
1884	[iii.]	Table showing for each Month and for each Degree of Latitude from 18° N. to 49° N. the Total Number of Hours during which the Sun is above the Horizon.
,,	[i.]	On London Rain. By W. J. Russell, Ph.D., F.R.S.
,,	[ii.]	On the Amount of Carbonic Acid in London Air. By W. J Russell, Ph.D., F.R.S.
1885	[i.]	On the Impurities in London Air. By W. J. Russell, Ph.D., F.R.S.
	[ii.]	Table showing the Mean Monthly and Annual Rainfall at the Weekly and Monthly Weather Report Stations for the 20 Years 1866 to 1885.

IV.—Quarterly Weather Report.

Year.	Page.	——
1869	43	Factors for Calculation of Gradients.
,,	[1]	Notes on Easterly Gales, by R. H. Scott.
1870	iii.	Description of Observatories, with illustrations of thermometer screens.
,,	[23]	Bessel's Paper on the Determination of the Law of a Periodical Phenomenon. Translated from the Astronomische Nachrichten, 136, for May, 1828.
1871	[7]	Discussion of Anemometrical Results for Orkney, 1863-68.
,,	[59]	Constants for the Determination of the Monthly March of Atmospherical Pressure, &c. at the Seven Observatories for 1869-70.
1872	[13]	Discussion of the Anemometrical Results at Bermuda from 1st April 1859 to 31st March 1863.
1873	[13]	Rainfall of the London District for Sixty Years, 1813-72. By G. Dines, F.M.S. [with diagram].
1874	[26]	On the Winds at Liverpool. By W. W. Rundell.
1875	[1]	Observations taken at Nine Stations of the Second Order [1875].
,,	[89]	Mean Monthly Results for the Seven Observatories for the Lustrum, 1871-75.
1876	[13]	Report on the Reduction of Greenwich Curves for 1875 to a Common Standard with those of Kew [with 25 plates].
,,	[20]	Results of Observations made at the Pagoda, Kew Gardens, to Determine the Influence of Height on Temperature, &c. By R. H. Scott, F.R.S. [4 plates.]
,,	[39]	Comparison of Results obtained by means of the Harmonic Analyser, with similar Results got from Measurement and Numerical Calculation for the Seven Observatories.
1877	[13]	On the Diurnal Range of Rainfall at the Seven Observatories in connexion with the Meteorological Office, 1871-80. By R. H. Scott, F.R.S. [5 plates.]
,,	[35]	Report on Evaporimeters. By W. N. Shaw, M.A. [2 plates.]
1878	[13]	On the Computation of the Quantity of Heat in excess of any Fixed Base Temperature, received at any place during the course of the Year, &c. By Lieut.-Gen. Strachey, R.E., F.R.S.
1879	[41]	Report on Hygrometric Methods, &c. Part I. By W. N. Shaw, M.A.
1880	[13]	Report on Experiments made at the Kew Observatory with Thermometer Screens of different patterns during 1879, 1880 and 1881. By G. M. Whipple, Superintendent.
,,	[19]	Tables and Diagrams illustrating the Diurnal Range of Barometric Pressure in the British Isles during the Years 1876-80. By F. C. Bayard, LL.M., F.R. Met. Soc. [5 plates.]

V.—Report of the Meteorological Committee of the Royal Society.

Year.	Page.	——
1867	27	A Description of the Self-recording Instruments recently erected by the Meteorological Committee of the Royal Society in various parts of the United Kingdom [with plates].
1869	25	Note upon a Self-registering Thermometer adapted to Deep-Sea Soundings, by W. A. Miller, M.D., Treasurer and V.P.R.S., extracted from Proceedings of Royal Society, vol. XVII., p. 482.

Year.	Page.	—
1869	36	Description of a Self-recording Rain-gauge, invented by Robert Beckley, of the Kew Observatory; made by James Hicks, London.
1870	25	Description of the Process by which the Traces of the Self-registering Instruments are reduced suitably for publication.
1872	27	A Summary of the Results obtained from the Discussion of the Information for Square 3, being the Region of the Doldrums in the Atlantic. By Capt. H. Toynbee, Marine Superintendent.
1874	33	The International Maritime Conference.

VA.—REPORT of the METEOROLOGICAL COUNCIL.

Year.	Page.	—
1877–78	21	Account of the Experiments on Atmospheric Electricity conducted at Kew Observatory. By Prof. J. D. Everett.
1879–80	28	On the Effect of Sluggishness on the Readings of Marine Barometers on Shore, by Prof. Stokes.
,,	43	On the Methods available for the Determination of the Humidity of the Atmosphere, by Mr. W. N. Shaw.
,,	46	Memorandum as to the Employment of the Harmonic Analyser in the Meteorological Office, by Prof. Stokes.
1880–81	25	On the Working of the Harmonic Analyser. [Prof. Stokes.]
,,	27	Report on Fogs. [W. J. Russell.]
,,	28	,, ,, Hygrometers and Evaporimeters, presented to the Meteorological Council, May 10, 1881. [W. N. Shaw.]
1881–82	25	On fogs. [W. J. Russell.]
,,	29	Report on the Results of a Tentative Reduction of a Year's Electrograms at the Kew Observatory. [G. M. Whipple.]
1882–83	27	On the Results obtained by the use of the Harmonic Analyser.
1884–85	22	Note on Work done with the Harmonic Analyser.
1885–86	22	Memorandum on Cloud Photography, by Prof. Stokes, F.R.S.
1886–87	21	On the Distribution of Gales round the Coasts of the British Isles [for the 15 years, 1871–85].
1887–88	22	On the History of the Severe Storms which visited the British Isles between August 1, 1882, and September 3, 1883, as traceable from the Atlantic Charts published by the Office. By Robert H. Scott, F R.S., Secretary.
,,	30	Abstract of Report on Hygrometric Methods, by W. N. Shaw, M.A., reprinted from the "Proceedings of the Royal Society," No. 262.
1888–89	22	Notes of some Results of an Examination of Atlantic Charts published by the Office, by R. H. Scott, F.R.S., Secretary.
,,	27	Memorandum on the Measurement of Squalls shown on the Traces yielded by Robinson Anemometers of the "Standard" Pattern, by R. H. Curtis.
1889–90	24	Code of Regulations, &c. for conducting the work at the First Class Observatories, and the Examination thereof. [See also Report, 1868.]
,,	36	Note on Experiments on Pressure of Wind made by Mr. W. H. Dines.
,,	46	Experiments with Violle's Actinometer Apparatus.
,,	47	On the Work done with the Harmonic Analyser at the Meteorological Office.

Year.	Page.	—
1890–91	22	On Mr. Dines' Anemometer Experiments.
1891–92	23	On Anemometer Comparisons carried out by the aid of a Grant from the Meteorological Council, by W. H. Dines, B.A.
1892–93	21	On the Construction of the Anemometer recently erected for trial on the roof of the Meteorological Office, by W. H. Dines, B.A.
„	27	On the Harmonic Analysis of Hourly Observations of Air Temperatures at British Observatories, by Lieut.-Gen. R. Strachey, F.R.S.
1894–95	27	Report on the Comparisons made between two Pressure Tube Anemometers on the roof of the Meteorological Office, by Mr. R. H. Curtis.
1895–96	24	Note on Anemometer Experiments, by Mr. R. H. Curtis.

VI.—HOURLY READINGS of the SELF-RECORDING INSTRUMENTS of the OBSERVATORIES in connexion with the METEOROLOGICAL OFFICE.

Year.	Page.	—
1883	[1]	Constants of formulæ expressing the mean daily range of temperature obtained by the use of the Harmonic Analyser.
1884	[1]	Tables and formulæ to facilitate the computation of harmonic coefficients. By Lieut.-General Strachey, R.E.

VII.—HOURLY MEANS of the READINGS obtained from the SELF-RECORDING INSTRUMENTS at the FIVE OBSERVATORIES under the METEOROLOGICAL COUNCIL.

Year.	Page.	—
1891	[1]	Tables of Hourly Sunshine Values, with Plates, for the Ten Years 1881–90, for Seven Observatories.

VIII.—METEOROLOGICAL OBSERVATIONS at STATIONS of the SECOND ORDER.

Year.	Page.	—
1891	[186]	Results of Observations at Stations of the Second Order for the Fifteen years, 1876–90.

APPENDIX XVI.

LIST OF PUBLICATIONS issued under the Authority of the Meteorological Council.

OFFICIAL.

No. 1. Report of the Meteorological Committee for 1867. 1*s*.
2. Instructions for Meteorological Telegraphy. New Edition. 1891. Prepared for the use of observers exclusively.
3. Fishery Barometer Manual. (New edition, 1887.) 6*d*.
4. Charts showing the Surface Temperature of the South Atlantic Ocean in each Month of the Year. 2*s*. 6*d*.
5. Report of the Meteorological Committee for 1868. 5*d*.
6. Report of the Meteorological Committee for 1869. 10*d*.
7. Quarterly Weather Report for 1869.—Parts I. to IV. 5*s*. each.
8. Barometer Manual. (Out of print. See Nos. 3, 24, 40, 60, and 61.)
9. Quarterly Weather Report for 1870.—Parts I. to IV. 5*s*. each.
10. Report of the Meteorological Committee for 1870. 10*d*.
11. Contributions to our Knowledge of the Meteorology of Cape Horn and the West Coast of South America. 2*s*. 6*d*.
12. Currents and Surface Temperature of the North Atlantic Ocean, from the Equator to Lat. 40° N., for each month of the year, with a General Current Chart. 2*s*. 6*d*.
13. A Discussion of the Meteorology of that Part of the Atlantic lying North of 30° N., for the Eleven Days ending 8th February, 1870. With Book of Charts, 5*s*.
14. Quarterly Weather Report for 1871.—Parts I. to IV. 5*s*. each.
15. Report of the Meteorological Committee for 1871. 10*d*.
16. Quarterly Weather Report for 1871.—Parts I. to IV. 5*s*. each.
17. Report of the Meteorological Committee for 1872. 1*s*.
18. Contributions to our Knowledge of the Meteorology of the Antarctic Regions. 2*s*.
19. Quarterly Weather Report for 1873.—Parts I. to IV. 5*s*. each.
20. Charts of Meteorological Data for Square 3. Lat. 0°—10° N. Long. 20°—30° W., and remarks to accompany the Monthly Charts, which show the Best Routes across the Equator for each Month, &c. 20*s*.
21. Report of the Proceedings of the Meteorological Congress at Vienna. 1873. 1*s*.
22. Report of the Meteorological Committee for 1873. 4*d*.
23. Report of the Proceedings of the Conference on Maritime Meteorology held in London. 1874. 2*s*.

24. Instructions in the Use of Meteorological Instruments. [Reprinted 1892.] (New edition in course of preparation.) 2*s.* 6*d.*
25. Quarterly Weather Report for 1874.—Parts I., II., and IV., 5*s.* each. Part III., 5*s.* 9*d.*
26. Report of the Meteorological Committee for 1874. 6*d.*
27. Charts of Meteorological Data for the Nine 10° Squares of the Atlantic which lie between 20° N. and 10° S., and extend from 10° to 40° W., with accompanying Remarks, ending with the Best Routes across the Equator. 24*s.*
28. Contribution to the Meteorology of Japan. By Staff-Commander Thomas H. Tizard, H.M.S. *Challenger.* 1*s.*
29. Report of the Meteorological Committee for 1875. 4*d.*
30. Quarterly Weather Report for 1875.—Parts I.—IV. 5*s.* each.
31. Report of the Meteorological Committee for 1876-7. 3*s.* 5*d.*
32. The Meteorology of the North Atlantic during August, 1873, with 31 Synoptic Charts. With Book of Charts. 15*s.*
33. Quarterly Weather Report for 1876 (New Series).—Part I., 6*s.*; Parts II., III., and IV., 5*s.* each.

*33A. Meteorological Observations at Stations of the Second Order for the year 1876.

33B. Meteorological Observations at Stations of the Second Order for the year 1877.

34. Contributions to our Knowledge of the Meteorology of the Arctic Regions.—Vol. I.: Part I., 2*s.*; Part II., 10*s.*; Part III., 6*s.*; Part IV., 5*s.*; Part V., 6*s.*
35. Report of the Meteorological Council for 1877-8. 1*s.*
36. Report of the Proceedings of the Second International Meteorological Congress at Rome, 1879. 1*s.* 6*d.*
37. Report on the Meteorology of Kerguelen Island. By Rev. S. J. Perry, S.J., F.R.S. 3*s.*
38. Report of the Meteorological Council for 1878-9. 5*d.*
39. Meteorological Observations at Stations of the Second Order for the year 1878. 20*s.*
40. Aids to the Study and Forecast of Weather, by W. Clement Ley, M.A. 1*s.*
41. Report of the Meteorological Council for 1879-80. 1*s.*
42. Report of the Meteorological Council for 1880-81. 1*s.* 2*d.*
43. Meteorological Charts for the Ocean District adjacent to the Cape of Good Hope, with accompanying Remarks. Charts, 25*s.*; Remarks, 7*s.*
44. Report on the Gales experienced in the Ocean District adjacent to the Cape of Good Hope, between Lat. 30° and 50° S., and Long 10° and 40° E., by Capt. H. Toynbee, F.R.A.S. 7*s.* 6*d.*
45. Meteorological Observations at Stations of the Second Order for the year 1879. 20*s.*
46. Report on the Storm of October 13-14, 1881. By Robert H. Scott, F.R.S. 1*s.* 6*d.*

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* The Observations at Stations of the Second Order for the years 1873–1875 will be found in the Quarterly Weather Reports for the respective years.

LIST OF PUBLICATIONS—*continued.*

47. Rainfall Tables of the British Isles for 1866-80. Compiled by G. J. Symons, F.R.S. 7*s*. 6*d*.
48. Report of the Meteorological Council for 1881-2. 1*s*.
49. Quarterly Weather Report for 1879. (New Series.) Parts I., II., and III., 6*s*. each; Part IV., 5*s*. 6*d*. Appendices and Plates. 27*s*.
50. Quarterly Weather Report for 1880. (New Series.) Parts I. and II., 6*s*. each; Part III., 4*s*.; Part IV., 6*s*. Appendices and Plates. 28*s*.
51.* Hourly Readings from the Self-Recording Instruments at the Seven Observatories under the Meteorological Council, 1881. (New Series.) Part I., 10*s*. 6*d*. Parts II., III., and IV., 21*s*. each.
52. Quarterly Weather Report for 1877. (New Series.) Part I., 10*s*.; Part II., 5*s*.; Part III., 4*s*. 6*d*.; Part IV., 6*s*. Appendices and Plates. 27*s*.
53. Meteorological Atlas of the British Isles. 5*s*. 6*d*.
54. Hourly Readings from the Self-Recording Instruments at the Seven Observatories under the Meteorological Council, 1882. Parts I. and II., 20*s*. each; Part III., 22*s*. 6*d*.; Part IV., 26*s*.
55. Quarterly Weather Report for 1878. (New Series.) Parts I., II., III., and IV., 6*s*. each. Appendices and Plates. 28*s*.
56. Sunshine Records of the United Kingdom for 1881. 4*s*.
57. Meteorological Observations at Stations of the Second Order for the year 1880. 34*s*. 6*d*.
58. Report of the Meteorological Council for 1882-3. 10½*d*.
59. Charts showing the Surface Temperature of the Atlantic, Indian, and Pacific Oceans. 21*s*.
60. Principles of Forecasting by means of Weather Charts. By the Hon. Ralph Abercromby, F.R.Met.Soc. (Second edition.) Revised. 2*s*.
61. A Barometer Manual for the Use of Seamen. With an Appendix on the Thermometer, Hygrometer, and Hydrometer. (Third Edition.) 6*d*.
62. Monthly Weather Reports for 1884. Jan., Feb., March, May—Nov., 1*s*. 6*d* each. April (with 2 Appendices), 2*s*. 6*d*. Dec., 1*s*. 9*d*.
63. Hourly Readings from the Self-Recording Instruments at the Seven Observatories under the Meteorological Council, 1883. Parts I., II., and III., 21*s*. each; Part IV., 30*s*.
64. Report of the Meteorological Council for 1883-4. 1*s*. 2*d*.
65. Monthly Weather Reports for 1885. Jan. to Dec., 1*s*. 6*d*. each.
66. Meteorological Observations at Stations of the Second Order for the year 1881. 35*s*.
67. Report of the Meteorological Council for 1884-5. 4*s*. 4*d*.
68. Monthly Weather Reports for 1886. Jan. to Dec., 1*s*. 6*d*. each.

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* For the years 1874–1880 the Hourly Readings were issued in lithographed form. Price 20*s*. per annum.

69. Meteorological Observations at Stations of the Second Order for the year 1882. 35*s*.
70. Hourly Readings from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1884. Part I., 12*s*.; Part II., 10*s*.; Part III., 10*s*. 6*d*.; Part IV., 15*s*.
71. Synchronous Weather Charts of the North Atlantic and the adjacent Continents. Aug. 1, 1882, to Sept. 3, 1883. Parts I. to IV. (33 sheets each.) 17*s*. each.
72. Report of the Meteorological Council for 1885-86. 8*d*.
73. Meteorological Observations at Stations of the Second Order for the year 1883. 30*s*.
74. Hourly Readings from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1885. Parts I. and II., 11*s*. each; Part III., 10*s*. 6*d*. Part IV., 12*s*.
75. Report of the Meteorological Council for 1886-87. 8*d*.
76. Charts showing the Mean Barometric Pressure over the Atlantic, Indian, and Pacific Oceans. 10*s*. 6*d*. Supplementary Chart, 6*d*.
*77. Monthly Weather Reports for 1887. January to April, 1*s*. 6*d*. each. May to December, in wrapper, 12*s*.
78. Meteorological Observations at Stations of the Second Order for the year 1884. 32*s*.
79. Report of the Meteorological Council for 1887-88. 1*s*.
80. Daily Weather Charts for the period of six weeks ending June 25, 1885, to illustrate the tracks of two cyclones in the Arabian Sea. 10*s*.
81. Hourly Readings from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1886. Parts I., II., and III., 10*s*. 6*d*. each. Part IV., 12*s*. 6*d*.
82. Meteorological Observations at Stations of the Second Order for the year 1885. 31*s*.
83. Meteorological Observations at the Foreign and Colonial Stations of the Royal Engineers and the Army Medical Department. 1852-1886. 23*s*.
84. Report of the Meteorological Council for 1888-89. 5½*d*.
†85. Weekly Weather Report for the year 1888. Vol. 5. Second Series. 4*d*. per week. With Appendices and Monthly Supplements, priced separately. Annual subscription, including Supplements and Appendices, post paid, 21*s*. 2*d*.
86. Weekly Weather Report for the year 1889. Vol. VI. Second Series. 6*d*. per week. With Appendices and Monthly Supplements, priced separately. Annual subscription, including Supplements and Appendices, post paid, 30*s*.
87. Weekly Weather Report for the year 1890. Vol. VII. Third Series. (For Price, &c., see No. 86.)

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* Publication continued after this year as a Supplement to the Weekly Weather Report.

† The publication of the Weekly Weather Report began in February 1878, Annual Subscription, 1878–1883, 12*s*. 6*d*.; 1884–1887, 21*s*. 2*d*.

LIST OF PUBLICATIONS—*continued.*

88. Meteorological Observations at Stations of the Second Order for the year 1886. 25*s*.
89. Meteorological Observations made at Sanchez, Samaná Bay, St. Domingo. 1886-88. By the late W. Reid, M.D. 8*s*. 6*d*.
90. Cyclone Tracks in the South Indian Ocean. From information compiled by Dr. Meldrum, C.M.G., F.R.S. 7*s*.
91. Report of the Meteorological Council for 1889-90. 7½*d*.
92. Meteorological Charts of the portion of the Indian Ocean adjacent to Cape Guardafui and Ras Hafún. 6*s*.
93. Harmonic Analysis of Hourly Observations of Air Temperature and of Pressure at British Observatories. 12*s*.
94. Hourly Means of the Readings obtained from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1887. 16*s*.
95. Meteorological Observations at Stations of the Second Order for the year 1887. 24*s*.
96. Weekly Weather Report for the year 1891. Vol. VIII., Third Series. (For Price, &c., see No. 86.)
97. Hourly Means of the Readings obtained from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1888. 20*s*.
98. Ten Years Sunshine in the British Isles, 1881-90. 2*s*.
99. Report of the Meteorological Council for 1890-91. 5½*d*.
00. Weekly Weather Report for the year 1892. Vol. IX., Third Series. (For Price, &c., see No. 86.)
101. Meteorological Observations at Stations of the Second Order for the year 1888. 22*s*.
102. Report of the International Meteorological Conference at Munich in 1891. 1*s*. 6*d*.
103. Hourly Means of the Readings obtained from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1889. 15*s*.
104. Report of the Meteorological Council for 1891-92. 6*d*.
105. Hourly Means of the Readings obtained from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1890. 20*s*.
106. Meteorological Charts of the Red Sea. 21*s*.
107. Weekly Weather Report for the year 1893. Vol. X., Third Series. (For Price, &c., see No. 86.)
108. Meteorological Observations at Stations of the Second Order for the year 1889. 34*s*.
109. Report of the Meteorological Council for 1892-93. 8*d*.
110. Meteorological Observations at Stations of the Second Order for the year 1890. 34*s*.
111. Weekly Weather Report for the year 1894. Vol. XI., Third Series. (For Price, &c., see No. 86.)
112. Report of the Meteorological Council for 1893-94. 7½*d*.
113. Hourly Means of the Readings obtained from the Self-Recording Instruments at the Five Observatories under the Meteorological Council, 1891. 32*s*. 6*d*.
114. Rainfall Tables of the British Isles, 1866-90. 6*s*.

115. Report of the International Meteorological Committee. Upsala, 1894. 1*s*.
116. Weekly Weather Report for the year 1895. Vol. XII., Third Series. (For Price, &c., see No. 86.)
117. Meteorological Observations at Stations of the Second Order for the year 1891. 30*s*.
118. Hourly Means of the Readings obtained from the Self-Recording Instruments at the Five Observatories under the Meteorological Council, 1892. 21*s*.
119. Report of the Meteorological Council for 1894-95. 8½*d*.
120. Meteorological Observations at Stations of the Second Order for the year 1892. 27*s*.
121. Weekly Weather Report for the year 1896. Vol. XIII. Third Series. (For Price, &c., see No. 86.)
122. Report of the Meteorological Council for 1895-96. 8½*d*.
123. Meteorological Charts for the district between the Cape of Good Hope and New Zealand. (In the Press.)
124. Monthly Current Charts for the Indian Ocean, from Information collated and prepared in the Meteorological Office. Published by the Admiralty. 7*s*.
125. Meteorological Observations at Stations of the Second Order for the year 1893. 27*s*.
126. Hourly Means of the Readings obtained from the Self-Recording Instruments at the Five Observatories under the Meteorological Council, 1893. 24*s*.
127. Report of the International Meteorological Conference. Paris, 1896. 1*s*.
128. Weekly Weather Report for the Year 1897. Vol. XIV., Third Series. (For Price, &c., see No. 86.)
129. Meteorological Observations at Stations of the Second Order for the year 1894. 27*s*.
130. Report of the Meteorological Council for 1896-97. 8*d*.
131. Hourly Means of the Readings obtained from the Self-Recording Instruments at the Five Observatories under the Meteorological Council, 1894. 24*s*.
132. Monthly Current Charts for the Atlantic Ocean. From information collated and prepared in the Meteorological Office. Published by the Admiralty. 7*s*.
133. Weekly Weather Report for the year 1898. Vol. XV., Third Series. (For Price, &c., see No. 86.)
134. Quarterly Current Charts for the Pacific Ocean. From Information collated and prepared in the Meteorological Office. Published by the Admiralty. 5*s*.
135. Hourly Means of the Readings obtained from the Self-Recording Instruments at the Five Observatories under the Meteorological Council. 1895. (In the Press.)
136. Report of the Meteorological Council for 1897-98.
137. Meteorological Observations at Stations of the Second Order for the year 1895. (In the Press.)

LIST OF PUBLICATIONS—*continued.*

NON-OFFICIAL.

No. 1. Report of an Inquiry into the Connexion between Strong Winds and Barometrical Differences.—By Robert H. Scott, Director of the Office. 6*d.*

2. Report to the Committee of the Meteorological Office on the Meteorology of the North Atlantic.—By Captain H. Toynbee, F.R.A.S., Marine Superintendent. 1*s.*

3. Report to the Committee of the Meteorological Office on the Use of Isobaric Curves.—By Captain H. Toynbee, F.R.A.S., Marine Superintendent. [Out of Print.]

4. Routes for Steamers from Aden to the Straits of Sunda and back. Translated from a Paper issued by the Royal Meteorological Institute of the Netherlands. 6*d.*

5. On the Winds, &c., of the North Atlantic along the Tracks of Steamers from the Channel to New York. Translated from a Paper issued by the Deutsche Seewarte, Hamburg. 6*d.*

6. Report of the Proceedings of the Meteorological Conference at Leipzig. 1872. 1*s.*

7. Notes on the Forms of Cyclones in the Southern Indian Ocean.—By C. Meldrum, M.A., F.R.S. [Out of Print.]

8. Report on Weather Telegraphy and Storm Warnings. Presented to the Meteorological Congress at Vienna. 1873. 6*d.*

9. Report of the Permanent Committee of the First International Meteorological Congress at Vienna for 1874. Meetings held at Vienna and Utrecht, 1873-1874. 1*s.* 6*d.*

10. On the Physical Geography of the part of the Atlantic which lies between 20° N. and 10° S. and extends from 10° to 40° W. A Paper read before the British Association at Bristol, in August, 1875.—By Capt. H. Toynbee, F.R.A.S., F.R.G.S., Marine Superintendent. [Out of Print.]

11. Report of the Permanent Committee of the First International Congress at Vienna. Meeting at London, 1876. With Supplement. 2*s.*

12. Reports to the Permanent Committee of the First International Meteorological Congress at Vienna on Atmospheric Electricity, Maritime Meteorology, and Weather Telegraphy, 1878. 2*s.*

13. Report of the Permanent Committee of the First International Congress at Vienna. Meeting at Utrecht, October, 1878. 6*d.*

14. Report of the International Meteorological Committee. Meeting at Berne, 1880. 1*s.*

15. Report of the Second Meeting of the International Meteorological Committee, held at Copenhagen, August 1882. 2*s.* 6*d.*

16. Report of the Third Meeting of the International Meteorological Committee, held at Paris, September 1885. 1*s.*

17. Report of the Fourth Meeting of the International Meteorological Committee, held at Zürich, September, 1888. 4*d.*

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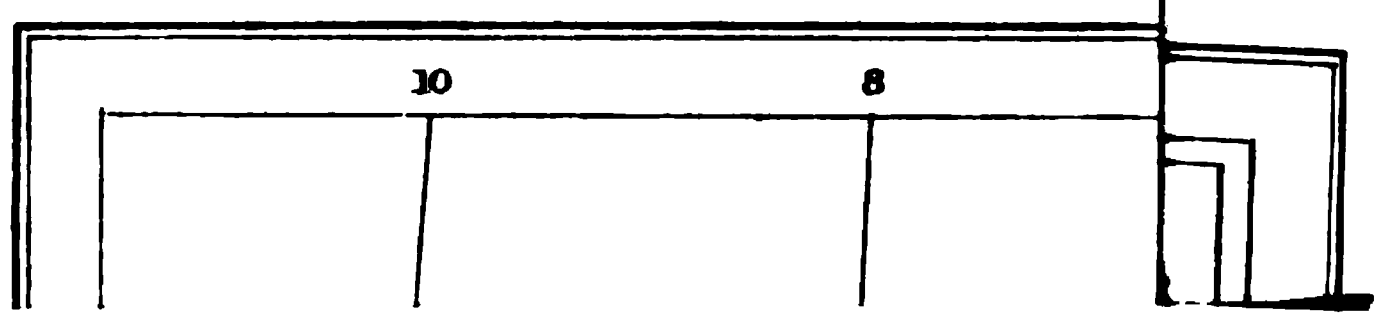

REPORT

HARVARD COLLEGE LIBRARY

OF THE

METEOROLOGICAL COUNCIL,

For the Year ending 31st of March, 1899,

TO THE

PRESIDENT AND COUNCIL

OF THE

ROYAL SOCIETY.

Presented to both Houses of Parliament by Command of Her Majesty.

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THE METEOROLOGICAL COUNCIL,

1898–99.

Lieutenant-General SIR RICHARD STRACHEY, R.E., G.C.S.I., LL.D., F.R.S., Chairman.

MR. ALEXANDER BUCHAN, M.A., LL.D., F.R.S., F.R.S.E.

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REPORT

OF THE

METEOROLOGICAL COUNCIL,

For the Year ending 31st of March 1899,

TO THE

PRESIDENT AND COUNCIL

OF THE

ROYAL SOCIETY.

Introductory.

The executive of the Office is the same as before, Mr. R. H. Scott, M.A., D.Sc., F.R.S., being the Secretary, and Nav.-Lieut. C. W. Baillie, R.N., F.R.A.S., the Marine Superintendent.

Superannuation allowances to Office staff.

For some time past the Council have had under their consideration the necessity for making systematic provision for superannuation allowances to members of the staff, some of whom will soon have reached such an age that retirement, after prolonged service, becomes desirable. The system under which this may best be arranged offers some difficulties, and the details have not yet been settled. In any case it will be necessary to revise the appropriation of the grant at the disposal of the Council, under the heads to which it has hitherto been allotted, and to make reductions in some directions, in order to provide the means for a satisfactory arrangement. It is hoped that this may be effected without any material diminution of the scientific or practical usefulness of the work of the Office, in view of the fact that the discussions of the results of certain observations extending over a long series of years, have already been completed, and may now without objection be discontinued wholly or in part.

National Physical Laboratory

The establishment of the National Physical Laboratory, provision for which is included in the Parliamentary Estimates of the current year, will lead to a change in the management of the Kew Observatory. The work of that institution, so far as it has relation to meteorology, or meteorological instruments, has been conducted in close communication with the Meteorological Office. It is intended that the existing relations between this Office and the Observatory shall be maintained in all essentials on their present footing, and it may reasonably be anticipated that the improved status of the Observatory will be beneficial rather than otherwise, from the point of view of meteorology.

The work of the Office may be conveniently considered under four heads, namely:

I. Ocean Meteorology.
II. Weather Telegraphy.
III. Climatology.
IV. Miscellaneous Investigations, and Administration.

PART I.

Ocean Meteorology.

Collection of information.

Collection of Information.—The Office continues, as in the past, to collect data with respect to the meteorology of the ocean, and to carry out this object complete outfits of meteorological instruments are supplied to officers of merchant ships who are willing to make observations at sea.

The instruments supplied are:—

One barometer; six thermometers, with a screen; four hydrometers.

On the return of the ship to England the officer sends in a fair copy of the meteorological log and returns the instruments to the Office or to its agents.

Her Majesty's ships also are supplied with instruments, which, however, differ slightly from those lent to the Mercantile Marine. The Council continues to receive valuable observations from the officers of the Royal Navy.

Agents.

In order to facilitate the supply of instruments to the Mercantile Marine, agencies are established at some of the principal ports.

The following is a list of these agents:—

Cardiff, T. L. Ainsley, Bute Docks.
Dundee, Capt. A. Wood, Navigation School.
Glasgow, Messrs. D. McGregor and Co., Clyde Place.
Greenock, Messrs. D. McGregor and Co., Brymner Street.
Hull, Messrs. Castle and Co., Commercial Road.
Liverpool, J. Gill, Nautical College.
Southampton, Capt. D. Forbes, High Street.

The number of merchant ships supplied with instruments and log books during the year has been 114.

Sets of instruments are kept in working order at the Office in London, and at each agency, for the purpose of instructing observers in the method of observation. Notices to captains as to the supply of instruments are frequently distributed from the Office.

Recognition of "excellent" observers.

As a mark of recognition of valuable co-operation, the Council present various publications to observers who return well-kept logs. A list of the publications of the Office is given in Appendix XVI., p. 125.

Appendix I. (p. 35) contains a list of the observers who have, during the past year, contributed logs classed as "excellent." The Council take this opportunity of expressing their best thanks to those who have thus assisted them. Several of these observers have co-operated with the Office for many years. The names which appear in the list for the first time are as follows:—

Observer's Name.	Ship.
Alsop, J. J.	Barque "Brussels."
Bertie, J. L....	S.S. "American."
Bobardt, A. O., Surgeon, R.N. ...	H.M.S. "Dart."
Boothby, G. C.	S.S. "Heraclides."
Clarke, W. H.	S.S. "Nomadic" and S.S. "Tauric."
Clinock, T. C.	S.S. "Harlech Castle."
Davies, H.	S.S. "La Plata."
Evans, J. E....	S.S. "Wolf."
Gifford, H. C.	S.S. "Amber."
Goudge, E.	S.S. "Naworth Castle."
Haddock, H. J., R.N.R.	S.S. "Britannic."
James, E. Gates, R.N.R.	"Airlie."
Lewis, J.	S.S. "Lassell."
Lowe, J.	S.S. "Duffield."
Mackay, H., R.N.R.	S.S. "Lucania."
Moseley, F. J., R.N.R.	S.S. "Goorkha."
Murray, J. A.	"Milwaukee."
Parry, J. F., R.N.	H.M.S. "Dart."
Reynolds, R., R.N.R.	S.S. "Norman."
Thomas, W....	S.S. "Templemore."
Tyson, J.	S.S. "Moor."
Wade, W. J.	Barque "Loch Sloy."
Wadsworth, F. H.	S.S. "Ethiopia."

Death of excellent observers

The Council have to note with great regret the death of four of their observers. Capt. S. Trott, of the ss. "Minia," commenced observing in 1884, and had kept thirty-six "excellent" logs. Capt. F. H. Crotty, of the ship "Evesham Abbey," Capt. W. E. White, R.N.R., of the R.M.S. "Ormuz," and Capt. J. Johnston, of the barque "Blengfell" had also kept logs of the same high character.

Character of logs received.

The meteorological logs received during the year numbered 148, of which 137 were either "excellent" or "very good."

The Council have continued to receive, through the Ocean Steamship Company of Liverpool, a considerable number of logs, principally relating to voyages to and from the China Seas, viâ Suez.

Districts from which observations are obtained.

A list of the meteorological logs received at the Office from ships during the year is given in Appendix II. (p. 37).

The following list gives a summary of the voyages for each ocean made by the ships specified in this Appendix.

North Atlantic ...	541	Pacific Ocean, South ...	111
South „ ...	147	Mediterranean ...	81
Indian Ocean ..	132	Red Sea ...	66
Pacific Ocean, North ...	36	Arctic Ocean ...	2

Publications.

Various publications of the Office in connection with ocean meteorology have been either completed during the year, or are in progress.

Southern Ocean.

The Meteorology of the Southern Ocean.—The region referred to lies between the Cape of Good Hope and New Zealand, south of latitude 30° S. These charts were described in the last Annual Report. They have now been engraved, and the Introductory Remarks to complete the volume are in the press, so that the work may be expected to appear shortly.

South Atlantic.

The Meteorology of the South Atlantic and of the West Coast of South America.—All the available information extracted from the Office logs and from those of Her Majesty's Ships has been analysed, and a large proportion of this material has been tabulated, ready for discussion. The charting of the data will shortly be taken in hand.

Observations from the Pacific Ocean.

Observations from the Pacific Ocean.—The arrangements described in last Report for the supply of instruments from Her Majesty's Dockyard at Sydney to observers navigating the Pacific Ocean have been in operation. As the logs from this Ocean continue to come in to the Office, the Current observations are plotted on the large scale charts so as gradually to improve the Current Charts for the Pacific Ocean recently published.

The Weather of the Winter 1898-99.

The Weather of the Winter, 1898-99, *over the North Atlantic.*—Gales of unusual severity prevailed in the Atlantic during last winter, and the Council, therefore, decided to carry out an enquiry into the weather over the northern part of that Ocean for the two months, beginning with the middle of December. One of their staff has been sent to Liverpool for a few days, where he met with very great encouragement from all the chief shipping companies, who supplied him with observations for 2,700 days. Fairly representative charts for sixty days may be founded on these observations.

Proposal for New Mode of Discussion of Logs.

A proposal for a new mode of tabulation and publication of data from ships' logs was received from the Deutsche Seewarte, Hamburg, but the Council after careful consideration decided that they could not undertake to carry out such a scheme.

Instruments for distant stations.

Collection of Meteorological Observations from Distant Stations.—It has been the custom of the Office to supply instruments to observers in unfrequented parts of the world, when it has reason to believe that the observations will be taken with due care, the observers undertaking to send in copies of their observations.

A list of the documents received during the year from such foreign land stations is given in Appendix XII. (p. 96).

The only new station of this class supplied with instruments on loan during the past year was Lagos. Capt. Standen, Army Service Corps, is the observer. A mountain barometer and some portable thermometers were lent to Capt. Deasy for his journey across the Pamirs to Yarkand.

Information supplied for the Admiralty.

Climatological Information for the Admiralty.—Statistics as to the climates of foreign ports are from time to time required by the Admiralty for use in various publications; a good deal of research is required to supply the necessary information. The districts so dealt with during the year have been the West Coast of Africa, the China Seas, and New Zealand.

Stock of instruments belonging to the Office.

Supply and Stock of Instruments.—In Appendix III. (p. 48) a list is given of the meteorological instruments supplied during the year by the Office to the Royal Navy, together with a statement of the stock and of the distribution of the instruments standing on the books to the account of the Admiralty on the 31st March, 1899. The recent large increases to the Navy have led to a corresponding increase in the stock of instruments required for Her Majesty's ships.

Appendix IV. (p. 49) gives similar information with regard to the disposal of the other instruments belonging to the Office, which either remain in store, or have been supplied to the Mercantile Marine, to Observatories, or to Telegraphic Stations, &c.

PART II.

Weather Telegraphy and Forecasts.

General.

The forecasts issued by the Office of the probable weather throughout the United Kingdom are based on meteorological observations made at a number of stations, which are in direct telegraphic communication with the Office.

The Telegraphic Reporting Stations are those marked with the letter "T" in the list given in Appendix XI. (p. 89), and the same Appendix contains at p. 94 a list of the Foreign Stations which send daily telegrams to the Office.

The staff of observers has undergone some changes during the year. The station at the North Foreland ceased to send reports on Dec. 31, as Lloyds' had closed their Signal Station there. Ardrossan also ceased reporting at the end of the financial year. It has been in operation for thirty-six years, but has been closed because the station at Malin Head has been established with a better exposure to the open sea than Ardrossan could afford. It is proposed to close other telegraphic stations shortly.

At Donaghadee the observer has resigned, and the duty of reporting has been taken over by the Coastguard at the station.

At Scilly the site of the thermometer stand and anemometer has been taken over by the War Office, so that the Council have had to enter into a fresh agreement for the tenancy of Garrison Hill, St. Mary's.

The General Post Office has recently made an alteration in their charges for supplying copies of telegrams sent abroad. The Council are glad to find that this change will result in a reduction of about £50 in the amount chargeable to their Office for telegraphy.

There has been no serious interruption of telegraphic communication during the year.

The Office receives a large number of inquiries concerning the weather, and a considerable amount of investigation and correspondence is required to obtain the needed information.

Inspection of the Stations.

Inspection of the Telegraphic Reporting Stations.—The stations in the United Kingdom have been inspected during the year, in England by Messrs. Gaster, R. H. Curtis, J. A. Curtis, and Brodie; those in Scotland by Mr. Buchan, and in Ireland and Wales by Mr. Scott.

The reports of the Inspectors are printed in Appendix V. (p. 50), and they show that efficiency has been maintained.

Discussion of the reports.

Discussion and Publication of the Information received.—A detailed account of the manner in which the meteorological information received by telegraph is utilised was given in Appendix X. of the Report for 1891, and there has been no change of procedure since that date. The Daily Weather Report contains a synopsis of the weather on the day of issue, based on the telegraphic data; this has appeared regularly during the year.

Distribution of reports.

Certain copies of the Daily Weather Report are distributed without charge, namely, 7 to newspapers, 71 for public exhibition at seaports, 80 to Government Offices and public institutions, 61 to correspondents of the Office, and 35 to foreign meteorological institutions. The issue to paying subscribers amounted to nearly 200 copies.

Weekly Weather Report.

The Weekly Weather Report, and the various Appendices, contain Weekly and Monthly Summaries of the chief elements of the Weather. Details as to those publications are contained in Part III., p. 17, and in Appendix VI., p. 75.

Display of information in front of the Office.

Display at the Meteorological Office in London of Information as to the Weather on British Coasts.—At 9.30 a.m. and 3 p.m. every week day the substance of the reports received by telegraph, as to the state of the weather and of the sea at the following stations: Yarmouth, Dungeness, the Needles (Hurst Castle), Scilly, Holyhead, and Valencia Island, is conspicuously displayed on the balcony of the Office, at 63, Victoria Street, S.W. At the same hours charts are suspended in the portico of the street door, which exhibit the latest information from all our coasts, and the latest forecasts and storm warnings that have been issued. The Council have reason to believe that the public appreciates the opportunity thus afforded them of learning the state of the weather on the coasts.

Forecasts for the Admiralty.

Supply of Forecasts to the Admiralty.—At the request of the Admiralty daily forecasts are supplied regularly to the Commander-in-Chief, at Devonport.

Forecasts.

Weather Forecasts.—Forecasts are made three times a day, namely, at 11 a.m., at 3.30 p.m., and 8.30 p.m. The Forecasts, issued at 11 a.m., are based on the telegrams of observations made at 8 a.m., and refer to a period of 24 hours from noon on the day of issue. These Forecasts are exhibited at several places in London,* and are supplied to newspapers for their later editions. The Forecasts issued at 3.30 p.m. have been of use in the special series of Hay Harvest Forecasts referred to on p. 11. The forecasts at 8.30 p.m. are prepared for the next morning's newspapers. Each of the forecasts has its special applicability, and is available to the public on inquiry at the Office either by letter, by telegram, or in person.

Inquiries at the Office.

The inquiries received by telegram through the Post Office for special forecasts amounted during the year to 117, and the personal applications to 76. The rules of the Office relating to such inquiries are stated in Appendix VI., p. 79.

Results of Forecasts.

A comparison for the year of the Forecasts for the United Kingdom issued at 8.30 p.m., with the subsequent weather actually experienced, is given in detail in Appendix VII., p. 80. The complete success, partial success, partial failure, and complete failure of the forecast is estimated according to definite rules which are designed to eliminate bias as far as possible.

It will here suffice to state that partial success means that the Forecast was correct for more than half the elements dealt with at the places of observation situated in the district in question, and a similar interpretation is to be applied to the term partial in the case of the failures.

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* In the City at the Mansion House, Lloyd's Rooms, Messrs. R. & J. Beck's, Cornhill, and Messrs. de la Rue & Co.'s, Bunhill Row; in the West End, in the Libraries of the House of Lords and the House of Commons; at Messrs. Elliott's, St. Martin's Lane; Messrs. Stanford's, Charing Cross; Messrs. Negretti & Zambra's, Regent Street; and at the Office, 63, Victoria Street.

The detailed comparison of the Forecasts with actuality may be summarised as follows:— Results of Forecasts.

SUMMARY of RESULTS of 8.30 p.m. FORECASTS, 1898-99.

Districts.	Per-centages.				
	Complete Success.	Partial Success.	Partial Failure.	Complete Failure.	Sum of Successes, Complete and Partial.
SCOTLAND, N. ...	56	28	12	4	84
„ E. ...	53	28	15	4	81
ENGLAND, N.E. ...	60	26	11	3	86
„ E.	56	29	12	3	85
MIDLAND COUNTIES...	54	30	14	2	84
ENGLAND, S.	59	29	10	2	88
SCOTLAND, W. ...	51	27	16	6	78
ENGLAND, N.W. ...	55	27	13	5	82
„ S.W. ...	57	27	12	4	84
IRELAND, N.	52	29	14	5	81
„ S.	49	29	16	6	78
Summary ...	55	28	13	4	83

In order to test the success of the Forecasts of the year in comparison with those of previous ones, the following table has been drawn up. It shows for each year of the decade 1889-98 the per-centages of complete and partial success of the Forecast issued at 8.30 p.m. It will be noticed that the highest degree of complete success was obtained in 1893, and that 1898 did not fall far short of that figure.

PER-CENTAGES of SUCCESS in the FORECASTS for the whole of the BRITISH ISLES.

Year.	Complete Success.	Partial Success.	Sum of Successes, Complete and Partial.
1889	49	32	81
1890	50	32	82
1891	50	30	80
1892	46	33	79
1893	59	25	84
1894	56	27	83
1895	55	25	80
1896	54	27	81
1897	55	26	81
1898	55	28	83
Average	52·9	28·5	81·4

Hay Harvest Forecasts.—As in previous years the Council have during the hay harvest sent Daily Forecasts, without charge, to certain observers selected by the Royal Agricultural Society, the Royal Dublin Society, and the Highland and Agricultural Society. The Council make it a condition for the supply of these forecasts, that the information Hay Harvest Forecasts.

Hay Harvest Forecasts.

shall be disseminated by the recipients as widely as possible, and that a record of the weather actually experienced shall be sent weekly to the Office.

LIST of RECIPIENTS of the HAY HARVEST FORECASTS in 1898.

Districts.	Recipients.	Address.
0. SCOTLAND, N. ...	Rev. Dr. Joass ...	Golspie.
	Major Smith	Munlochy, Inverness.
1. SCOTLAND, E. ...	T. Wilson	Glamis Castle, by Forfar.
	C. Pirrie	Rothiemay, Huntly.
	T. Bett	Dalnaline, Aberfeldy.
2. ENGLAND, N.E. ...	Sir J. Wilson... ...	Chillingham Barns, Belford Northumberland.
	J. Smith	The Ferneries, Ulceby.
3. ENGLAND, E. ...	Garnett Taylor ...	Trowse House, Thorpe, Norwich.
	Sir J. B. Lawes, Bt., and Sir J. H. Gilbert.	Rothamsted, Harpenden.
4. MIDLAND COUNTIES ...	Royal Agricultural College.	Cirencester.
	H. G. Godfrey Payton	Warwick.
	T. H. Thursfield ...	The Grange, Much Wenlock.
	F. E. Harcourt-Vernon	Grove Hall, East Retford.
5. ENGLAND, S. ...	The South-Eastern Agricultural College.	Wye, near Ashford, Kent.
	C. Whitehead ...	Barming House, Maidstone.
	E. P. Squarey ...	The Moot, Downton, Wilts.
	M. J. Sutton	Kidmore Grange, Caversham.
6. SCOTLAND, W. ...	W. Calder	Castle Hill, Dalreoch, Dumbarton.
	Sir M. J. Stewart, Bt., M.P.	Ardwell, Stranraer.
	J. Laughton	Eallabus House, Islay.
7. ENGLAND, N.W.	Lord Egerton of Tatton	Tatton Park, Knutsford.
	R. Metcalfe, M.D. ...	Eastfield Lodge, Leyburn, Yorkshire.
8. ENGLAND, S.W. ..	The Earl of Ducie ...	Tortworth, Gloucestershire.
	T. Dyke	Long Ashton, Clifton, Bristol.
	R. Neville Grenville	Butleigh Court, Glastonbury.
9. IRELAND, N. ...	E. F. Farrell	Moynalty, Co. Meath.
	J. M. Wilson, J.P. ...	Currygrane, Edgeworthstown.
10. IRELAND, S. ...	G. H. Major	Connellan, Coolmore, Thomastown.
	W. Talbot Crosbie ...	Ardfert Abbey, Tralee, Co. Kerry.

Hay Harvest Forecasts.

The telegrams were sent daily for the period of about five weeks, commencing in some districts on June 6th. In certain cases, by special request, they were continued for a longer period. They were also sent to six subscribers.

The information from which the degree of success of the Forecasts has been estimated was furnished by the recipients themselves. The following table, compiled from these estimates, contains a summary of the independent judgments of those to whom the telegrams were sent.

SUMMARY OF RESULTS.—HAY HARVEST FORECASTS, 1898.

Districts.	Names of Stations.	Per-centages.				Sum of Successes, Complete and Partial.
		Complete Success.	Partial Success.	Partial Failure.	Complete Failure.	
SCOTLAND, N. ..	Munlochy and Golspie	46	40	12	2	86
„ E. ..	Aberfeldy, Glamis, and Rothiemay..	49	39	10	2	88
ENGLAND, N.E. ..	Belford and Ulceby	58	30	11	1	88
„ E. ..	Rothamsted and Thorpe	62	26	11	1	88
MIDLAND COUNTIES	Cirencester, East Retford, Warwick, Much Wenlock.	68	18	12	2	86
ENGLAND, S. ..	Maidstone, Downton, Caversham, and Wye.	68	28	3	1	96
SCOTLAND, W. ..	Ardwell, Islay, and Dumbarton ..	51	41	8	—	92
ENGLAND, N.W. ..	Leyburn and Knutsford	53	40	7	—	93
„ S.W. ..	Tortworth, Clifton, and Glastonbury	69	23	7	1	92
IRELAND, N. ..	Moynalty and Edgeworthstown ..	57	19	21	3	76
„ S... ..	Tralee and Thomastown	57	33	10	—	90
	Mean for all districts	58	31	10	1	89

These figures show that 89 per cent. of the Forecasts were useful; the corresponding per-centage in 1897 was 90. Several of the recipients have written expressing their satisfaction with the accuracy of the Forecasts.

Storm Warnings.

Storm Warnings for the Coasts of the United Kingdom.—Warnings of coming storms are despatched by telegraph to certain stations on the coast. These stations are supplied with signals which are hoisted as warnings to mariners of expected storms. The signals are defined in Circular 717 of the Board of Trade, issued in February, 1874.

A list of the stations is given in Appendix VIII., p. 81. At the end of March, 1899, there were 234, of which 121 were in England and Wales, 70 in Scotland, 31 in Ireland, 4 in the Isle of Man, and 3 in the Channel Islands.

A comparison has been made in the Office between the warnings issued during the year and the subsequent weather actually experi-

enced. The method of comparison is explained in Appendix VI., p. 79, and the results are exhibited in the following table:—

COMPARISON between the WARNINGS and the subsequent WEATHER in 1898.

Coasts.	Total No. of Warnings.	Warnings justified by subsequent Gales. Force 8 and upwards.	Warnings justified by subsequent strong Winds. Forces 6 & 7.	Warnings not justified by subsequent Weather.	Warnings late. Force 8 reached at two Stations before issue.	Warnings partially late. Force 8 reached at one Station before issue.	Warnings issued in consequence of telegraphic errors.	Storms for which no Warning was issued.
Scotland, N.E. ...	57	38	8	6	1	3	1	Nov. 27–28.
„ E. ...	39	14	21	4	—	—	—	Feb. 15–16.
„ N.W. ...	57	32	16	7	—	2	—	—
„ W. ...	54	29	18	7	—	—	—	—
Ireland, S.W. ...	53	29	16	5	2	1	—	—
„ N.W. ...	57	40	9	1	1	6	—	May 2–3, Nov. 27–28.
Irish Sea	54	41	7	4	—	2	—	Feb. 15-16.
St. George's Channel	41	21	15	5	—	—	—	—
Bristol Channel ...	37	27	4	3	1	2	—	April 30.
England, S.W. ...	33	21	7	2	—	3	—	April 30.
„ S. ...	25	11	13	1	—	—	—	—
„ S.E. ...	24	12	12	—	—	—	—	—
„ E. ...	24	18	6	—	—	—	—	Feb. 2.
„ N.E. ...	26	14	8	3	1	—	—	Feb. 2.
Totals ...	581	347	160	48	6	19	1	
Percentages...		59·8	27·5	8·2	1·0	3·3	0·2	

NOTES as to GALES EXPERIENCED in 1898, for which no WARNING was issued.

February 2nd—ENGLAND, E. and N.E. A W. gale.

The W. and N. coasts had all been warned an Jan. 31st, but, owing to another deep depression which appeared over our N. districts, the gale spread further south than was anticipated.

February 15th–16th—SCOTLAND, E. and IRISH SEA. A N.W. gale.

The extreme N. and N.W. coasts had been duly warned on the 14th and 15th, but, as in the previous case, the gale spread further to the south than was expected.

April 30th—ENGLAND, S.W. and BRISTOL CHANNEL. A S.E. to S.W. gale.

A depression was lying off our W. coasts on April 29th, but was only moderate. During the night a well-marked secondary reached Cornwall without giving any indication of its approach, and at 8 a.m. on the 30th it was too late to warn these coasts. The S. and E. coasts were all warned in time.

May 2nd–3rd—IRELAND, N.W. An E. gale.

The N.E. and E. of Scotland were duly warned, but it was not expected that the gale would reach the Irish coasts.

November 27th-28th—SCOTLAND, N.E., and IRELAND, N.W.
A N. gale, very sporadic, and occurring on a Sunday.

At 8 a.m. the distribution of pressure was very complex, strong winds being indicated, but no gale. The gales actually experienced occurred only at the most exposed stations in the districts.

Comparison of results for 1898 with previous years.

The following table contains a statement of the amount of success of storm warnings in the decade 1889-98. It will be seen that the warnings were not quite so successful as in the last few years.

Years.	Total No. of Warnings issued.	Warnings justified by subsequent Gales.	Warnings justified by subsequent strong Winds.	Total Warnings justified.	Warnings not justified by subsequent Weather.
		p.c.	p.c.	p.c.	p.c.
1889	373	47·7	33·5	81·2	16·9
1890	525	61·0	25·5	86·5	9·3
1891	522	62·3	24·5	86·8	7·5
1892	488	59·4	31·2	90·6	6·8
1893	480	60·8	28·6	89·4	7·1
1894	502	68·5	23·5	92·0	6·0
1895	523	63·3	26·4	89·7	8·0
1896	467	67·7	23·8	91·5	2·9
1897	596	60·1	31·7	91·8	4·5
1898	581	59·8	27·5	87·3	4·5

Fishery Barometers.

Fishery Barometers.—Barometers have for many years been lent by the Office to fishing villages and other places on the coast, for the benefit of sailors and fishermen. A list of the stations thus provided is given in Appendix IX., p. 84. There are 220 stations of this kind, of which 67 are in England, 7 in Wales, 62 in Ireland, 79 in Scotland, 4 in the Isle of Man, and 1 in Jersey.

PART III.

CLIMATOLOGY.

I.—BRITISH ISLES.

Climatology.

Meteorological observations of the highest refinement and completeness entail considerable expense, and the service of highly trained observers. It has, therefore, been the policy of the Office to subsidise, and to maintain an intimate relationship with, a small number of observatories of the highest class. The data derived from these stations are suited for such investigations as require minute and continuous knowledge of the several meteorological elements. These stations are, however, too few and too widely scattered to afford a good general representation of the conditions of climate, the winds, barometric pressure, temperature, and sunshine of the British Isles, and it has accordingly been found necessary to supplement them by certain other "anemographic," "barographic," and "sunshine" stations.

The distribution of stations required for representing the climate of these islands likewise differs from that needed for the forecasting of the weather. For the latter purpose the Office relies only on the "Telegraphic Reporting Stations" referred to in Part II.

The climate of different parts of Great Britain and Ireland is very diverse, and fortunately there are throughout the country many stations where good meteorological observations are made by volunteer observers. Such of these stations as furnish the Office with observations are classed as stations of the second and third order respectively

according to the amount of information furnished by each. In addition to these stations there are others—maintained by various public bodies—that send up observations, and some of these, such as the Observatory at Bidston, Liverpool, and the Radcliffe Observatory, at Oxford, are really first order Observatories, although ranking in the Office list as of the second order only by reason of the smaller amount of information supplied by them to the Office.

A list of all the stations is given in Appendix XI. (p. 89). Certain letters are attached to each station, which indicate the nature of the information supplied to the Office. From what has been just stated it will have appeared that the stations may be classified in seven categories; but an examination of the list in Appendix XI. will show that the categories to a certain extent over-lap, so that the same station may occur in two of them.

The seven categories are as follows:—

Observatories of first order.

1. *Observatories of the First Order*, maintained or subsidised by the Office, and furnishing continuous photographic records of the barometrical pressure and the temperature, and continuous records of rainfall, wind, and bright sunshine with frequent eye observations of the weather, and of the kind and amount of cloud.

Anemographic Stations.

2. *Anemographic Stations* which furnish continuous records of the direction and force of the wind. These records are often of use in affording evidence in courts of law, and they are regularly employed in checking the accuracy of the storm warnings.

Barographic Stations.

3. *Barographic Stations* which furnish continuous records from the aneroid barometer.

Sunshine Stations.

4. *Sunshine Stations* which furnish continuous records of bright sunshine. At most of these the record is made by the Campbell-Stokes instrument, of which an account was given in the Annual Report of the Office for 1879 (p. 32.)

The stations of the categories 2, 3, and 4 are of especial service in matters which relate to the weather, as distinguished from climate.

Telegraphic Reporting Stations.

5. *Telegraphic Reporting Stations* which furnish the data for the forecasts and storm warnings, as explained in Part II.

Second Order Stations.

6. *Stations of the Second Order* which furnish complete climatological data. The observations are taken twice a day, and the observers are volunteers and unpaid.

Third Order Stations.

7. *Stations of the Third Order* which resemble those of the second order, except that the information sent to the Office is less full.

An account of the methods employed by the Office in dealing with all these records is given in Appendix X., p. 85.

The stations may be summarised as follows:—

Class.	Description.	Number.
1	Observatories	7
2	Anemographic stations	15
3	Barographic (Aneroid) stations	16
4	Sunshine stations	73
5	Telegraphic stations	30
6	Second Order stations	84
7	Third Order stations	77

Inspection of Stations.

Inspection of the Stations.—The stations classified under the heads 1, 2, 5 and 6 are regularly inspected, while those in Classes 3, 4 and 7 are visited as opportunity offers. Some of the stations of Class 6 belong to the Royal Meteorological Society, and are visited by an Inspector appointed by that Society. In accordance with the recommendation of the Treasury Committee (1877) a contribution towards the cost of this inspection is made by the Office. The rest of the stations of Class 6 are visited, in most cases annually, by the Inspectors of the Office. The inspection of the seven principal observatories and of some of the anemographic stations was carried out by Messrs. T. W. Baker and E. G. Constable, of Kew Observatory.

Extracts from the reports of the Inspectors are given in Appendix V., p. 50.

Reports supplied to Registrar-General for Ireland.

Information supplied to the General Register Office, Dublin.—Reports from the Irish stations have been supplied regularly to the Registrar General for Ireland, for his Weekly and Quarterly Returns.

Information supplied to the Local Government Board.—Particulars as to the rainfall in the South-East of England in the early autumns of 1897 and 1898 were supplied to the Local Government Board at Mr. Chaplin's request.

Publications. Weekly.

Details as to the Weekly Weather Report, which is prepared in the Telegraphic Branch of the Office, are given in Appendix VI. (p. 75). It supplies, by its synchronous daily charts and Monthly Summaries, an instructive view of the meteorological changes, day by day, over the greater part of Europe.

Appendix I. of the Weekly Weather Report for 1898 gives a summary for each quarter, and for the whole year, of the Rainfall and Temperature in each district, for the 33 years, 1866-1898, and also the Monthly and Progressive values of "Accumulated Heat," Rainfall, and Bright Sunshine for all the districts in each month of 1898.

Appendix II. to the same Report, gives, in continuation of the similar Appendices for 1897 the Weekly and Progressive values of the same elements during the year 1898.

Hourly Means of Meteorological Observations.

Hourly Means of Meteorological Observations.—Commencing with the year 1887, the Office has prepared and published for each year mean values obtained from the hourly readings yielded by the continuously self-recording instruments at their five first-class observatories. These means are for pressure, temperature and the hygrometric condition of the air, the force and direction of the wind, and the amounts of rainfall and sunshine. They are obtained for each hour of the day for periods of five days, for the calendar months, and for the year, and they supply a complete synopsis of the march of the different elements at the several observatories.

Recently, however, it was represented to the Council, by the Meteorological Conference which met at Paris in the autumn of 1896, that for certain investigations these mean values are insufficient, and that for some of the elements at least, and for a few observatories, it is desirable to publish the original hourly readings as derived from the records of the self-registering instruments; the Council have therefore arranged that, commencing with the year 1895, they will add to the volume of *Hourly Means* the hourly readings of pressure, temperature, and rainfall for the observatories of Valencia and Kew, as typical of the conditions prevailing respectively at a coast and at an inland station of the British Isles.

Hourly Means of Meteorological Observations.

The volume of *Hourly Means* for 1895 has not yet been published owing to serious delay at the printing office. A few pages still remain to be revised, and it is hoped that the volume will be ready for issue very shortly.

The volume will contain an Appendix, in which will be found mean hourly values of pressure and temperature for each month, for the five lustra 1871-1895, and also for the entire period of twenty-five years; and also the average hourly amount and frequency of rainfall for the same period; and in addition the mean hourly duration of sunshine for the fifteen years 1881-1895.

Meanwhile the preparation of the volume for the year 1896 has been steadily carried on, and the work is now in a forward state.

The computation of the harmonic components of the diurnal variation of pressure and temperature has been carried to the end of 1895, so that the series is now complete for 27 years.

Observations at Ben Nevis and Fort William.

Observations at Ben Nevis and Fort William.—The directors of the observatories at Ben Nevis and Fort William intimated that the funds at their disposal, including the grants made by the Meteorological Council, would not admit of the continued maintenance of these observatories; that in their opinion it was important that they should be kept open, at all events for two years, from July last; and that an additional sum of £1,000 would be necessary to admit of this being done. They accordingly applied to the Council for a grant of this amount. The Council in reply expressed their regret that it would not be possible for them, consistently with the other demands on the funds entrusted to them, to comply with this request. Further, as it would be out of their power to supply the funds which the Directors thought necessary to maintain the two observatories, in future, they resolved to give notice, under the arrangement originally made regarding these observatories, that the grants would cease after the end of the year 1901.

The correspondence on this subject with the Directors of the observatories and Her Majesty's Treasury, will be found in Appendix A, p. 21.

Publication of Climatological Observations

Observations at Stations of the Second Order.—The volume for 1895 is now issued, and that for 1896 is far advanced.

The form of this publication remains unchanged. It comprises, first, the actual observations at 9 a.m. and 9 p.m. at 21 stations, printed on a modification of the form, A., adopted for International use by the Meteorological Congress at Rome, 1879—and, secondly, the Monthly Means and Summaries at 51 stations printed in the form B. also adopted by the same Congress, together with an Annual Summary for all stations, and a Return of Bright Sunshine.

As stated in the last Report, the volume for 1895 differs from that for 1894 only by the disappearance from the B. list of Edgeworthstown, Ireland, and the inclusion of Tavistock in South Devon, the number of stations both A. and B. remaining as before.

The volume for 1896, now passing through the press, will include five new stations. namely, Woolacombe, near Ilfracombe, on Form A. (detailed observations), and Strathpeffer-Spa, N.B., Gilcrux, near Maryport, Belvoir Castle (Grantham), and Norwood (South London), on Form B., while two stations are discontinued, namely, Margate, where Mr. J. Stokes, F.R.Met.Soc., finds himself unable any longer to continue the evening observations, and Brookebrough, Co. Fermanagh, which has ceased owing to the death of Sir Victor Brooke, Bart.

The Council have recently received from the Office of Her Majesty's Woods and Forests an application for advice as to the institution of meteorological observations over the Forest of Dean.

Observations in Forest of Dean.

II.—Foreign and Colonial Stations.

Observations made at various Foreign and Colonial Stations are frequently received at the Meteorological Office.

Foreign and Colonial Stations.

During the year 46 such returns have come in, and a list of them is contained in Appendix XII., p. 96.

In most cases the observations were taken twice a day, and the results have been dealt with in the same way as those from Stations of the Second Order, in Class 6, p. 16. Continuous records of bright sunshine were received from Georgetown (Demerara).

The meteorological results given in the Cyprus Blue-Book, refer to six stations in the island. The tables continue to be compiled in the Office.

Returns from foreign and colonial stations have been published from time to time, but the Council have now determined upon a systematic publication of them. It was hoped that the first of these volumes (which will contain the available data up to, and inclusive of, 1895), would have already appeared, but owing to the pressure of other work and the reduction of staff, the requisite examination and preparation of the Returns has been delayed. The sheets are now, however, in a fairly forward condition, and it is expected that the work will be in the printer's hands before the end of the current year.

PART IV.

Miscellaneous Investigations and Administration.

Anemometer Experiments.—The bridled anemometer at Holyhead has not yet been dismounted, and the records of the three experimental anemometers on Salt Island, to which reference was made in last year's Report, have been kept regularly at work during the year. The relative infrequency of very strong winds makes the acquiring of sufficient data respecting high pressures a long process.

Anemometer Experiments

Atmospheric Electricity.—The Council having obtained from the Government Grant Committee the sum of £200 "for a research on the best methods of dealing with the Records of atmospherical electricity obtained at Kew Observatory," have requested Mr. C. T. R. Wilson, of Sidney-Sussex College, Cambridge, to undertake the proposed investigation, and Mr. Wilson has already submitted to the Council a preliminary report on the subject.

Atmospheric Electricity.

The diurnal Range of Rain.—A paper on the diurnal range of rain during the 20 years (1871-90), recorded by the Beckley's self-recording gauge, at the seven observatories in connection with the Office, has been drawn up by the Secretary, Mr. Scott, and will be printed by the Office.

Diurnal Range of Rain.

Exceptionally Heavy Falls of Rain.—In compliance with a request from some hydraulic engineers, a record of all the exceptionally heavy falls of rain at the seven observatories, 1871-98, has been drawn up by Mr. Scott and submitted to the Royal Meteorological Society for publication in their Quarterly Journal.

Heavy Falls of Rain.

The Library, &c.

Library.

The library contains standard works and serial publications on Meteorology and the allied sciences. It consists at present of about 15,000 volumes and pamphlets, there are besides many charts and MS. records of observations. The library at the Office is accessible to students engaged in meteorological investigations.

Each work, immediately on receipt, is entered on a card under the Author's name, and is subsequently entered in a classified catalogue under the subject to which it refers.

Appendix XIII., p. 98, contains a list of the additions to the library during the year.

Appendix XV., p. 120, gives a list of the important contributions to meteorology which have appeared in the various reports issued by the Office since 1866.

Appendix XVI., p. 125, gives a catalogue of publications issuing from the Office.

Expenditure.

Financial.

Appendix XIV., p. 119, shows the receipts and payments during the year ending 31st March, 1899. The amount voted by Parliament was 15,300*l.*, as in the previous year, and the miscellaneous receipts amounted to £1,296 14s. 6d. In addition to these amounts the sum of £200 was received from the Government Grant Committee, as above explained.

The following abstract of expenditure shows the true charge against the grants of this and the preceding year, together with the increase or decrease in 1898-99, as compared with the previous year:—

Net Expenditure.	1897–98.	1898–99.	Increase.	Decrease.
General Administration:	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Payment of Council ...	968 9 5	990 0 0	21 10 7	—
Secretary	800 0 0	800 0 0	—	—
Office	990 1 3	930 0 0	—	60 1 3
Rent, Fuel, and Lighting	721 13 7	710 13 2	—	11 0 5
Alterations to premises and contingencies ...	313 11 8	236 2 9	—	77 8 11
Expenses incidental to International Meteorological Congress ...	—	4 3 10	4 3 10	—
Pensions	144 0 0	144 0 0	—	—
Special Researches ...	782 17 3	786 11 5	3 14 2	—
Land Meteorology ...	3,596 4 5	3,609 3 0	12 18 7	—
Weather Information ...	3,913 8 7	3,871 13 2	—	41 15 5
Inspections	403 5 11	431 17 4	28 11 5	—
Ocean Meteorology ...	2,350 12 1	2,489 1 7	138 9 6	—
Total ... ... £	14,984 4 2	15,003 6 3	209 8 1	190 6 0

In the year 1898–99 the sum of £1,726 0*s.* 5*d.* was paid to the Post Office on account of inland and foreign telegrams, allowances to telegraph clerks, rental of private wires, &c.

(Signed) R. STRACHEY,
Chairman.

June, 1899.

APPENDIX A.

CORRESPONDENCE relating to Allowances made by the Meteorological Council to the Ben Nevis Observatories.

SCOTTISH METEOROLOGICAL SOCIETY TO METEOROLOGICAL COUNCIL.

(M.O. 1262.)

Scottish Meteorological Society,
Edinburgh, July 23, 1898.

SIR,

WE are instructed by the Council of the Scottish Meteorological Society and the Directors of the Ben Nevis Observatories to send you the enclosed Extract from the last Report to the Society at their Meeting on the 21st inst., intimating the closing of the High and Low-level Observatories in October next. We are further instructed to say that this step is taken with deep regret.

We are, &c.,

JOHN M'LAREN, Vice-President.
JOHN MURRAY, Convener of Directors.
ARTHUR MITCHELL, Honorary Secretary.
ALEXANDER BUCHAN, Meteorological Secretary.
W. B. WILSON, Honorary Treasurer.

R. H. Scott, Esq., F.R.S.

EXTRACT FROM THE REPORT OF THE SCOTTISH METEOROLOGICAL SOCIETY TO THE HALF-YEARLY MEETING OF THE SOCIETY ON 21ST JULY, 1898.

Closing of the Ben Nevis Observatories.

The Directors greatly regret to have to announce that the High and the Low-level Observatories at Ben Nevis will cease to exist in October of this year. This is the necessary outcome of the want of funds. There is no way, so far as the Directors can see, by which these great first-class Meteorological Observatories can be continued, except by aid from the State. In other words, the Directors have no grounds for expecting that further assistance will come from private sources.

This decision has been come to in consequence of estimates submitted by the Honorary Treasurer, from which it appears that if, in October next, the property belonging to the Directors were realised and all obligations met, there would probably remain a balance of £250. If, however, the Observatories were carried on till October, 1899, there would be a debt of probably £150.

By the establishment of these Observatories, and the unique observations made at them, a great experiment has been carried out with signal success. In this work the Council of the Society has been strengthened by having on the Board of the Directors of the Observatories representatives of the Royal Society of London, the Royal Society of Edinburgh, and the Philosophical Society of Glasgow. The experiment has been, as anticipated, a costly one. A sum of no less than £18,150 has been expended on the inquiry, and the sum has been obtained by contributions partly from scientific bodies, but mainly from the public.

The Scottish Meteorological Society cannot fail to experience great satisfaction from its having been found possible to do so much; indeed, when resolving on making the experiment, and founding the Observatories, the most sanguine expectation could not have predicted the ready and liberal response made to the appeal for the necessary funds.

With much pleasure the Directors are able to report that in a large sense the objects aimed at have been attained. A long series of hourly observations has been obtained by night and by day without a break over a period of fifteen years, though these included eye or other observations outside in the severe climate of the top of Ben Nevis, forming a set of observations quite unique, nothing similar having as yet been done at any other High-level Observatory in the world.

The Directors would have been extremely glad if the period of simultaneous hourly observations at the High and Low-level Observatories could have been prolonged for other three years, in order to give ten annual instead of seven annual averages running from January to December, and to furnish a better basis for a minute and careful discussion of the mass of observations now in the possession of the Society, and available for the study of meteorological phenomena.

In conclusion, the Directors cannot contemplate without sadness the giving up of these two Observatories, both well-equipped and in full working order, especially as they are strongly of opinion that two such Observatories should continue to be carried on as essentials in the observing system of the country.

METEOROLOGICAL COUNCIL TO SCOTTISH METEOROLOGICAL SOCIETY.

Meteorological Office, July 25, 1898.

SIR,

I HAVE the honour to acknowledge the receipt of your letter of the 23rd instant, which shall be laid before the Meteorological Council.

I am, &c.,

ROBERT H. SCOTT, Secretary.

The Secretary, Scottish Meteorological Society.

SCOTTISH METEOROLOGICAL SOCIETY TO METEOROLOGICAL COUNCIL.

(M.O. 1316.)

Scottish Meteorological Society,
Edinburgh, July 28, 1898.

SIR,

WITH reference to our Circular of 23rd inst., intimating the closing of the Observatories at Ben Nevis in October next, we are now instructed to inform you that it will not be necessary this year to take that step. The annexed letter, which has been sent to the *Scotsman* and other newspapers, will explain how this satisfactory and gratifying result has been obtained.

We are, &c.,

JOHN M'LAREN, Vice-President.
JOHN MURRAY, Convener of Directors.
ARTHUR MITCHELL, Honorary Secretary.
ALEXANDER BUCHAN, Meteorological Secretary.
WILLIAM B. WILSON, Honorary Treasurer.

R. H. Scott, Esq.,

Scottish Meteorological Society,
Edinburgh, July 27, 1898.

SIR,

IT was announced last week in your columns that the Ben Nevis Observatories were to be closed in October next for want of funds. It gives me much pleasure to announce now that this will not be the case. I have received a letter from Mr. J. Mackay Bernard, Kippenross, in which he promises to give £500 "in order that the Observatories may be carried on for another year." The record of Observations for one whole year will thus be the result of Mr. Bernard's great generosity.

He expresses a hope in his letter that before the end of that year arrangements may have been made for the permanent carrying on of the work by State aid, and his very liberal and prompt action makes the Directors more hopeful than they were that this desirable end may yet be reached. But if the State does not charge itself with the maintenance of these Observatories, then Mr. Bernard's example may perhaps be followed by others, so that the Directors may at least be able to obtain continuous and complete observations for the eleven years of a Sun-spot period. This would mean the making of an important addition to knowledge by Scotland, and in that aspect Mr. Bernard is patriotic as well as liberal.

In conclusion, allow me to thank you, and the Press generally, in the name of the Directors, for the sympathetic attitude which has been taken by the newspapers towards the work carried on by the Scottish Meteorological Society.

I am, &c.,

ARTHUR MITCHELL,
Honorary Secretary.

METEOROLOGICAL COUNCIL TO SCOTTISH METEOROLOGICAL SOCIETY.

Meteorological Office, August 6, 1898.

SIR,

I HAVE the honour to acknowledge the receipt of your letter of the 28th ultimo, which shall be laid before the Meteorological Council.

I am, &c.,

C. W. BAILLIE, for Secretary.

The Secretary, Scottish Meteorological Society.

TREASURY TO METEOROLOGICAL COUNCIL.

(M.O. 1395.)

Treasury Chambers, August 17, 1898.

GENTLEMEN,

THE Lords Commissioners of Her Majesty's Treasury are aware that your attention has been called to recent questions and discussions in Parliament upon the announcement that the Ben Nevis Observatories are about to be closed.

My Lords understand that you at present subscribe £350 per annum to these institutions, and receive from them copies of their observations.

They do not doubt that at your next meeting this subject will come formally under your notice, and I am accordingly to inform you that my Lords consider (as stated on their behalf in Parliament) that any assistance from public funds to this institution should be provided out of the Parliamentary Grant administered by you for the benefit of meteorology throughout the United Kingdom generally.

My Lords must not be understood as expressing any opinion upon the scientific questions involved.

I am, &c.,

R. W. HANBURY.

The Meteorological Council,
63, Victoria Street, S.W.

METEOROLOGICAL COUNCIL TO TREASURY.

(M.O. 1395.)

Meteorological Office, August 23, 1898.

SIR,

I AM directed to acknowledge the receipt of your letter of the 17th instant (No. 13049/98), and in reply, to inform you that the subject therein referred to will be duly considered by the Meteorological Council at their next meeting, when they will have the honour to address you further regarding it.

I am, &c.,

C. W. BAILLIE, for Secretary.

The Secretary to the Treasury.

METEOROLOGICAL COUNCIL TO SCOTTISH METEOROLOGICAL SOCIETY.

(M.O. 1395.)

Meteorological Office, October 27, 1898.

DEAR SIR,

I AM instructed by the Meteorological Council to send to you a copy of the letter from the Treasury of the 17th August last, with reference to recent discussions in Parliament relating to the maintenance of the Ben Nevis Observatories, and also a copy of Mr. Hanbury's remarks on the same subject, as reported in the *Times* of the 12th of that month. (*Not printed here.*)

Yours faithfully,

ROBERT H. SCOTT, Secretary.

Dr. Buchan, F.R.S.,
Scottish Meteorological Society, Edinburgh.

SCOTTISH METEOROLOGICAL SOCIETY TO METEOROLOGICAL COUNCIL.

(M.O. 2021.)

Scottish Meteorological Society, Edinburgh,
December 2, 1898.

SIR,

DR. BUCHAN, the Meteorological Secretary, has submitted to the Directors of the Ben Nevis Observatories, your letter to him of 27th October, 1898, enclosing, at his request (1), a copy of the report

by the *Times* newspaper of 12th August, 1898, of Mr. Hanbury's answer to a question by Mr. Pirie, M.P., relating to the Ben Nevis Observatories; and (2), copy of a letter of 17th August, 1898, to the Secretary of the Meteorological Council from Mr. Hanbury, for the Lords Commissioners of H.M. Treasury, also relating to the Ben Nevis Observatories. Your letter bears that it was written by instruction from your Council, but there is no wish expressed in it that the enclosures should be laid before the Directors, for the purpose of eliciting their views in regard to the matter to which the enclosed documents relate. The Directors, however, assume that such was the wish of the Council, and they accordingly instruct me to write as follows:—

They desire, at the outset, to point out that the Lords Commissioners, as stated by Mr. Hanbury, "consider that any assistance from public funds (to the Ben Nevis Observatories), should be provided out of the Parliamentary Grant administered by you (the Council) for the benefit of meteorology throughout the United Kingdom generally." As the grant here referred to is administered by the Meteorological Council, the Directors will be glad to learn from them what they propose to do in the matter.

In order to assist the Council in considering the question, I am directed to enclose a copy of that part of the Report to the last General Meeting of the Scottish Meteorological Society which deals with the Ben Nevis Observatories, and also to furnish the Council with information as to the cost of working the observatories, as to their financial history, as to the suitability of their position, as to the composition of the Directorate, &c.

It appears, from the report referred to, that the observatories would have been closed in October last, as a "necessary outcome of the want of funds." But, soon after the meeting to which the report was made, a donation of £500 was received from Mr. Mackay Bernard, of Kippenross, for the purpose of keeping the two observatories at work for another year, and this sum, with the payment of £350 received annually from the Council and some other sources of income, will be sufficient for the purpose. But there is no expectation of further benefactions from the public, and, if State assistance is not obtained, it will be necessary to close both the High and Low Level Stations in October of next year. It seems of importance here to point out that the Directors would require to know, not later than July of next year, whether such assistance is to be given, because the provisioning of the High Level Station must be completed before winter begins.

The payment of £350 from the Council consists of an annual payment of £100 in respect of the High Level Station since 1881, and of an annual payment of £250 in respect of the Low Level Station since 1890, when it was established. In return for these payments copies of all observations at both stations are prepared and transmitted to the office of the Council. A detailed statement of what is sent to the Council is given in an appendix to this letter. The cost of this probably falls to be deducted from the payments made by the Council, in a strict calculation of the cost of carrying on the two observatories. But, assuming that this part of the work continues to be done as at present, then the experience of the Directors shows that about £500 a year would be needed in addition (1), to the £350 contributed by the Council, to which reference has just been made; (2), to the other sources of income, also just referred to, namely, profits, (1), from the sale of road permits and guide-books; and (2), from the supply of

weather reports to newspapers—the continuance of which may be safely counted on, and which amount to about £150. The actual total cost of carrying on the two observatories during the three years, from June, 1895, to June, 1898, has been £3,004 13*s.* 11*d.*, giving a yearly average of £1,001 11*s.* 4*d.*

The Treasury consider the annual grant of £15,300 as being "for the benefit of meteorology throughout the United Kingdom generally." This of course cannot be regarded as involving an expenditure in each of the three divisions of the United Kingdom of such a portion of the grant—after deduction of the necessarily central and large cost of the office and staff—as would correspond to the different populations, because some one division of the Kingdom may contain better localities and conditions for meteorological research than the others, and may thus, in the interest of the study of the Meteorology of the United Kingdom, broadly, be entitled to an expenditure within its borders of more of the grant than its proportion, as calculated on population. For instance, as regards the observatories at Ben Nevis, Scotland is in a position which is altogether exceptional. Not only is there no other place in the United Kingdom which is so favourably conditioned for making simultaneous high and low level observations, but there is probably no place in Europe so favourably conditioned. Its exceptional suitability lies in the concurrence of the two facts (1), that the height of the High Level Station is very considerable—4,406 feet; and (2), that the Low Level Station is at sea level, and on the sea shore, and is less than five miles distant from a perpendicular falling from the High Level Station. This special fitness of Ben Nevis and Fort William for high and low level stations, working together as practically one station, might justify the expending in Scotland of more than its proportion of the grant, as calculated on population. The two observatories have been established, and have for many years been carried on, mainly through assistance voluntarily given by the public. The total expenditure on them up to 30th June, 1898, has been £18,150. This sum will be increased when the amount which will be spent during the current year comes to be added. The observatories may, therefore, be fairly regarded as a striking example of courageous private enterprise in the search after additions to knowledge.

The Directors, in conclusion, trust that the Council may be able, either by some rearrangement of the work which they control and direct, or as the result of the establishment of a National Physical Laboratory, to set aside a sum out of the funds at their disposal which would be sufficient to keep the Ben Nevis Observatories in full operation.

It will be observed from the enclosed Report of the Scottish Meteorological Society, that the Directors are specially anxious that the two observatories should be continued in full operation for at least three years from October, 1898.

The Directors of the Observatories consist of the Council of the Scottish Meteorological Society, with four representatives from the following Societies,—one from the Royal Society of London, two from the Royal Society of Edinburgh, and one from the Philosophical Society of Glasgow. The four representatives at present are Lord Kelvin, Professor Tait, Professor Chrystal, and Mr. Gilbert Thomson, and the present members of Council of the Society, which consists of men of science and men of affairs, are the Duke of Richmond and Gordon, Lord McLaren, Sir John Murray, Professor Crum Brown, Sir Archibald Geikie, Professor Copeland, Professor Geikie, Mr. John

Aitken, Mr. J. Y. Buchanan, Mr. R. T. Omond, The Earl of Moray, Professor McKendrick, Dr. J. B. Russell, Sir James D. Marwick, Mr. Robert Cox, Mr. Wenley, Mr. J. G. Bartholomew, and Mr. W. B. Wilson. Eight of these are Fellows both of the Royal Society of London and the Royal Society of Edinburgh, and nine others are Fellows of the Royal Society of Edinburgh.

It is perhaps desirable to state that hourly observations for the four years at the High Level Station—1883 to 1887—have been published by the Royal Society of Edinburgh, that the hourly Observations for the next nine years made at the High Level Station, and also those made at the Low Level Station, since its establishment in 1890, are now ready for the press, and that efforts are being made to arrange for the publication of these last.

The Directors hope that this statement may be useful to the Council, and they beg to express their desire that a copy of it be forwarded to Mr. Hanbury, for the information of the Lords Commissioners of Her Majesty's Treasury.

I am, &c.,
ARTHUR MITCHELL,
Honorary Secretary.

R. H. Scott, Esq.,
Secretary of the Meteorological Council.

APPENDIX.

Data supplied to the Meteorological Council by the two Observatories.

I. Ben Nevis.—

One copy of each daily sheet containing the 24 hourly readings of the various instruments with daily totals and means, made and recorded in accordance with the instructions of the Directors of the Observatories.

II. Fort William.—

The photographic tracings of the barograph, dry bulb thermograph and wet bulb thermograph, along with the hourly values of these curves reduced to figures according to the regulations drawn up for such work by the Meteorological Council.

The traces of the self-registering rain gauge and hourly values similar to the above.

The traces of the sunshine recorder with the daily totals of same.

Eye readings of barometer and thermometer made seven times each day to control the self-recording instruments, which, along with notes of wind and weather, are done according to the regulations of the Meteorological Council and entered on forms provided by them.

Here follows the extract from the Report of the Scottish Meteorological Society to the half-yearly meeting of the Society on 21st July, 1898, on the closing of the Ben Nevis Observatories, already printed on p. 22.

METEOROLOGICAL COUNCIL TO SCOTTISH METEOROLOGICAL SOCIETY.

Meteorological Office, December 5, 1898.

SIR,

I HAVE the honour to acknowledge the receipt of your letter of the 2nd instant, which shall be laid before the Meteorological Council.

I am, &c.,
ROBERT H. SCOTT, Secretary.

The Secretary,
Scottish Meteorological Society.

Meteorological Council to Treasury.

(M.O. 2021.)

Meteorological Office, December 21, 1898.

Sir,

At the request of the Scottish Meteorological Society the accompanying papers relative to the maintenance of the Meteorological Observatories at Ben Nevis and Fort William are forwarded for the information of the Lords of the Treasury.

I am to add that the Meteorological Council will give early attention to the subject, and will communicate to you the result of their deliberations as soon as practicable.

I am, &c.,

Robert H. Scott, Secretary.

The Secretary of the Treasury.

Treasury to Meteorological Council.

(M.O. 4.)

Treasury Chambers, January 2, 1899.

Gentlemen,

I am directed by the Lords Commissioners of Her Majesty's Treasury to acknowledge the receipt of Mr. Scott's letter (M.O. 2021) of the 21st ultimo, and its enclosures respecting the maintenance of the Meteorological Observatories at Ben Nevis and Fort William.

My Lords await the further communication on the subject promised by you. It is desirable that they should be in the possession of your views before deciding upon the estimate to be presented to Parliament next session, which must shortly be considered.

I am, &c.,

R. W. Hanbury.

The Meteorological Council,
63, Victoria Street, S.W.

Meteorological Council to Treasury.

(M.O. 4.)

Meteorological Office, January 19, 1899.

Sir,

I am directed by the Meteorological Council to inform you, in continuation of my letter of the 21st ultimo, that the Council have given careful consideration to their position in relation to the Scottish Observatories at Ben Nevis and Fort William, with the results that I shall proceed to explain.

In 1879 the Council agreed to make a yearly grant of £100 in aid of the work to be carried on at the Observatory on Ben Nevis, as soon as it was brought into operation. This grant took effect from 1881 and has been continued up to the present time.

In 1889 and 1890 the Council further supplied for the Observatory at Fort William an equipment of self-registering and other Meteorological instruments, at a cost of about £275, and agreed to make an annual grant in aid of the maintenance of the Observatory of £250, on the understanding that (subject to the Treasury grant to the Council being continued) this contribution should be continued for five years, and that it should not be withdrawn without two years' previous notice. This grant has also been continued up to the present time, and notice of withdrawal has not hitherto been given.

The decision of the Managers of the two Scottish Observatories, announced in July of last year, of their inability to maintain the Oservatories unless an additional yearly sum of £500 was obtained for the purpose, was come to without any previous communication on the subject to the Meteorological Council, and neither in the published notice of this decision, nor in the letter dated the 23rd July, 1898, addressed to the Council by the Managers of the Observatory, was any allusion made to the yearly grant that had been made by the Council, nor any suggestion or claim put forward for its increase.

I am further to explain that for some time before this announcement was made, the Meteorological Council had arrived at the conclusion that the position of the staff of the Meteorological Office was such that the adoption of some system of superannuation had become essential, which could not be carried out without a considerable reduction of expenditure on other objects, or an equivalent increase to the Parliamentary grant. They therefore addressed the Royal Society on the subject, pointing out the nature of the difficulty, and proposing that the Treasury might be solicited to make such an additional grant as would enable the Council to meet it.

The President and Council of the Royal Society, while recognising the virtual necessity for a system of superannuation, considered, however, that the Meteorological Council should in the first place review their present expenditure, and endeavour to provide the necessary funds by reductions, where they could be made without undue sacrifice of essential objects, before the question of an additional grant could be entertained. The Meteorological Council could not avoid acquiescing in this conclusion, and are about to enter on such an enquiry as was suggested by the Royal Society. Copies of this correspondence are annexed. *(Not printed here.)*

In these circumstances, all that the Meteorological Council are able to say with reference to their attitude in relation to the Scottish Observatories is, that it is at present impossible to contemplate any increase of the present contributions, and much more likely that these will have to be reduced or discontinued, as soon as the conditions under which they were promised will admit of this being done.

For the same reason the Meteorological Council has been unable to give any definite reply to Sir Arthur Mitchell's letter dated the 2nd December, 1898, a copy of which was forwarded to the Treasury.

I am, &c.,
ROBERT H. SCOTT, Secretary.

The Secretary of the Treasury.

TREASURY TO METEOROLOGICAL COUNCIL.

(M.O. 241.)

Treasury Chambers, January 30, 1899.

GENTLEMEN,

I am directed by the Lords Commissioners of Her Majesty's Treasury to acknowledge the receipt of Mr. Scott's letter (M.O. 4) of the 19th instant, and to thank you for the full information as to the history of your relations with the Ben Nevis Observatory, and also as to the general financial position of the fund which you administer.

My Lords observe that the continuance of the Ben Nevis Observatory is secured up to October next, and is desired for two more years from that date; but that it is necessary for the managers of that institution to be in a position to decide as to its future not later than July next.

They further understand that your two present grants of £100 and £250 (or at least the second of them) cannot be withdrawn without two years' notice, and that such notice has not yet been given.

They note also that you are at present reconsidering the scope of your expenditure within the limits of the present grant for the reasons indicated in your correspondence with the Royal Society.

It appears, therefore, that, while on the one hand there is no need for an immediate decision, on the other hand there are reasons which make it difficult to form such a decision at once. But my Lords trust that you will find it possible to deal with the question definitely before July.

Referring to the letter from Sir A. Mitchell, of which you forwarded a copy on the 21st ultimo, my Lords have no doubt that you will weigh impartially the relative claims of the several branches of meteorological enquiry to a share in the funds at your disposal; and their confidence that full justice will be done to the case of Ben Nevis is increased by the fact that the Council includes an eminent representative of the Scotch meteorologists.

I am, &c.,
R. W. HANBURY.

The Meteorological Council,
63, Victoria Street, S.W.

SCOTTISH METEOROLOGICAL SOCIETY TO METEOROLOGICAL COUNCIL.

(M.O. 553.)

122, George Street, Edinburgh,
March 16, 1899.

SIR,

AT a meeting on the 11th instant of the Directors of the Ben Nevis Observatories, there was submitted a letter from Dr. Buchan, of date 9th instant, enclosing an excerpt from the minutes of the meeting of the Meteorological Council of January 2nd, 1899, which referred to the letter to the Council from the Directors of date 2nd December, 1898, and stating that the excerpt was sent to him for the information of the Directors. This excerpt is a copy of a letter, of date 19th January, 1899, from the Meteorological Council to the Lords of the Treasury.

There was at the same time submitted a copy of Mr. Hanbury's answer, dated 30th January, 1899, which was also enclosed in Dr. Buchan's letter referred to, and which he was desired by the Meteorological Council to forward to the Directors.

After consideration of these documents, the Directors now instruct me to make application to the Meteorological Council for a grant of one thousand pounds, in addition to the three hundred and fifty pounds now received annually, in order to enable them to carry on the two Ben Nevis Observatories till the autumn of 1901, and to express a hope that the Council will be able to grant this assistance, as a special value attaches to having the work carried on till that period.

I am, &c.,
ARTHUR MITCHELL,
Honorary Secretary.

R. H. Scott, Esq.,
Secretary of the Meteorological Council.

METEOROLOGICAL COUNCIL TO SCOTTISH METEOROLOGICAL SOCIETY.

(M.O. 553.)

Meteorological Office, March 29, 1899.

SIR,

I AM directed by the Meteorological Council to acknowledge the receipt of your letter of the 16th March, which informs them that Dr. Buchan had, as requested by the Council, communicated to your Directors a copy of a letter dated the 19th January last addressed to the Secretary of the Treasury by the Council, relative to the grants hitherto made in aid of the Observatories at Ben Nevis and Fort William, and the reasons that rendered it improbable that any addition could be made to those grants, and possible that they might be reduced or discontinued.

The Council observe that after consideration of this letter and the reply to it from the Secretary of the Treasury, a copy of which you had also received, your Directors have thought it necessary to request the Council to make a grant of £1,000 in addition to the £350 heretofore given, to enable them to carry on the two Observatories till the autumn of 1901, as a special value attaches to having the work continued till that period.

In reply to this request I am directed to express the great regret of the Council that it is quite beyond their power to comply with it, consistently with the other claims upon the sum placed at their disposal by Parliament, and the obligations that have to be met, as explained in their letter to the Treasury of the 19th January last, in connection with the provision of superannuation allowances to their staff. The necessities of their position will indeed impose on them the duty of reducing their expenditure to such an extent as must, in some direction at least, limit their future power of aiding meteorological research, and without questioning the value of the work done at the two Scottish Observatories now in view, they have felt it impossible to avoid the conclusion above communicated to you.

I am to remind you that the Council, in arriving at this decision, have before them the circumstance, that besides the Central Observatory at Kew, and that at Valencia in Ireland, only one Observatory in England, that at Falmouth, has for some years past received any grant from the Meteorological Council. Falmouth last year received £255, while in Scotland the grants to Aberdeen, Ben Nevis and Fort William aggregated £625.

As the Council understand from your letter under reply that your Directors do not contemplate the continuance of work at Ben Nevis or Fort William after 1901, they think it will be convenient that you should now receive the formal notice, contemplated when the grants to these Observatories were first made, that the grants will cease at the end of the year 1901.

I am, &c.,
ROBERT H. SCOTT, Secretary.

Sir A. Mitchell, K.C.B.,
Honorary Secretary, Scottish Meteorological Society.

METEOROLOGICAL COUNCIL TO TREASURY.

(M.O. 553.)

Meteorological Office, March 29, 1899.

SIR,

IN continuation of former correspondence, the Meteorological Council direct me to forward for your information copies of a letter

lately received by them from the Directors of the Observatories of Ben Nevis and Fort William, and of their reply to that letter.

The Meteorological Council have come to the conclusions stated in their letter to the Directors of the Scottish Observatories with much regret, but the prolonged consideration of the measures that it will be necessary for them to take, in order to carry out the contemplated arrangements for superannuation, have in their opinion left no alternative course of action open to them, unless the annual grant made to them were increased by £1,200, the sum named in their letter of the 11th May last to the President of the Royal Society, a copy of which was forwarded to you with my letter of the 21st December last.

I am, &c.,

ROBERT H. SCOTT.

To the Secretary of the Treasury.

TREASURY TO METEOROLOGICAL COUNCIL.

(M.O. 754.)

Treasury Chambers, April 19, 1899.

GENTLEMEN,

The Lords Commissioners of Her Majesty's Treasury desire me to thank you for Mr. Scott's letter (M.O. 553) of the 29th March, and enclosures, respecting the grants from the funds under your control to the Ben Nevis and Fort William Observatories.

My Lords gather that you hold that there are claims on your funds more important, from your point of view, than would admit of the special donation of £1,000 for which the Directors of those Observatories ask, assuming the Parliamentary grant of £15,300 not to be increased.

I am to ask whether this correctly expresses your view.

I am, &c.,

R. W. HANBURY.

The Meteorological Council,
63, Victoria Street, S.W.

SCOTTISH METEOROLOGICAL SOCIETY TO METEOROLOGICAL COUNCIL.

(M.O. 792.)

Scottish Meteorological Society, Edinburgh,
April 24, 1899.

SIR,

AT the request of the Meteorological Council, Dr. Buchan gave me, a short time ago, a copy of a letter, without date, from the Council to the Secretary of the Treasury, for submission to the Director of the Ben Nevis Observatories at their first meeting.

With reference to this letter to the Treasury, I beg the Council to be good enough to send me a copy of the answer, which may be received from the Secretary of the Treasury.

I am, &c.,

ARTHUR MITCHELL.

R. H. SCOTT, Esq.,
Secretary, Meteorological Council.

METEOROLOGICAL COUNCIL TO TREASURY.

(M.O. 754.)

Meteorological Office, April 27, 1899.

SIR,

I AM instructed by the Meteorological Council to acknowledge receipt of your letter of the 19th instant (No. 5561/99), and, in reply, to state that it correctly describes the views of the Council.

I am, &c.,
ROBERT H. SCOTT, Secretary.

The Secretary of the Treasury.

TREASURY TO METEOROLOGICAL COUNCIL.

(M.O. 853.)

Treasury Chambers, May 4, 1889.

GENTLEMEN,

I AM directed by the Lords Commissioners of Her Majesty's Treasury to acknowledge the receipt of Mr. Scott's letter (M.O. 754) of the 27th ultimo, further respecting your inability to contribute a special donation of £1,000 towards the maintenance of the Ben Nevis and Fort William Observatories.

I am, &c.,
R. W. HANBURY.

The Meteorological Council,
63, Victoria Street, London, S.W.

METEOROLOGICAL COUNCIL TO SCOTTISH METEOROLOGICAL SOCIETY.

(M.O. 792.)

Meteorological Office, May 11, 1899.

SIR,

IN reply to your letter of the 24th ultimo, I am directed by the Meteorological Council to forward to you a copy of the correspondence which has passed between them and H. M. Treasury in connection with my letter of the 29th March last, a printed copy of which was handed to you by Dr. Buchan and referred to in your letter of the above date.

I am, &c.,
ROBERT H. SCOTT, Secretary.

Sir Arthur Mitchell, K.C.B.
Honorary Secretary, Scottish Meteorological Society.

SCOTTISH METEOROLOGICAL SOCIETY TO METEOROLOGICAL COUNCIL.

(M.O. 792.)

Scottish Meteorological Office, Edinburgh,
May 12, 1899.

SIR,

I BEG to acknowledge receipt of your letter of the 11th instant, with three inclosures.

I hope your Council will be kind enough to send me a copy of any further correspondence, relating to the Ben Nevis Observatories, which may pass between your Office and the Treasury.

I am, &c.,
ARTHUR MITCHELL.

Robert H. Scott, Esq.,
Meteorological Office.

APPENDIX.

APPENDIX I.

List of Captains and Officers who have sent in Logs classed as "Excellent" during the year ending March 31, 1899. Figures are attached to the name of each observer to show the number of "Excellent" logs which he has supplied during the whole time of his co-operation with the Office.

Name of Captain or Officer.	Number of "Excellent" Logs.	Ship.
Alford, F.	6	S.S. Monarch.
Alsop, J. J.	1	Barque Brussels.
Angus, T. S.	19	S.S. Britannia.
Bertie, J. L.	1	S S. American.
Bobardt, A. O., Surgeon, R.N.	1	H.M.S. Dart.
Boothby, G. C.	1	S.S. Heraclides.
Brewis, Sub-Lieut. C. R. W., R.N.	8	H.M.S. Penguin.
Bright, H.	12	Hornby Castle.
Clarke, W. H.	2	S.S. Nomadic and S.S. Tauric.
Clinock, T. C.	2	S.S. Harlech Castle.
Crewe, E.	2	S.S. Victoria.
Dart, L. C.	18	Barque Alcides.
Davies, E. H.	4	S.S. Heraclides.
Davies, H.	2	S.S. La Plata.
Dawson, W. P., R.N.	3	H.M.S. Waterwitch.
De la Garde. P., R.N. (Assistant Paymaster).	3	H.M.S. Waterwitch.
Dickinson, L. R.	2	S.S. Danube.
Docherty, H.	8	Barque Tinto Hill.
Dupen, P. P.	11	S.S. Cabenda and S.S. Biafra.
Dyke, H. W.	13	Rathdown.
England, T.	23	Barque Glen Grant.
Evans, J. E.	1	S.S. Wolf.
Field, A. M., R.N.	28	H.M.S. Penguin.
Fraser, W. D.	10	Corolla.
Gifford, H. C.	1	S.S. Amber.
Goudge, E.	1	S.S. Naworth Castle.
Griffin, E. J., R.N.R.	2	S.S. Moor.
Haddock, H. J., R.N.R. ...	1	S.S. Britannic.
Hepworth, M. W. C., R.N.R. ...	17	S.S. Aorangi.
Jaggard, R.	2	S.S. Waimate.
James, E. Gates, R.N.R. ...	1	Airlie.

Name of Captain or Officer.	Number of "Excellent" Logs.	Ship.
Lewis, J.	2	S.S. Lassell.
Lobb, Comr. F. J., R.N. ...	5	L.H. Tender Richmond.
Lowe, J....	2	S.S. Duffield.
Lowis, Lieut. A. W., R.N. ...	4	H.M.S. Penguin.
MacKay, H., R.N.R.	2	S.S. Lucania.
Martin, W., R N.R.	7	S.S. Mexican.
Millican, J. W....	16	S.S Loughrigg Holme.
Milne, W. F.	14	S.S. Eclipse.
Milner, W. H.	29	S.S. Atrato.
Milward, C. A., R.N.R. ...	2	S.S. Mataura.
Moseley, F. J., R.N.R.... ...	1	S.S. Goorkha.
Murdoch, P.	18	Sierra Lucena.
Murray, J. A.	1	Milwaukee.
Nares, Lieut. G. E., R.N. ...	4	H.M.S. Penguin.
Norman, F.	11	S.S. Indravelli.
Parry, J. F., R.N.	1	H.M.S. Dart.
Pascoe, Lieut. F. C., R N. ...	4	H.M.S. Penguin.
Peebles, R.	23	S.S. Breconshire.
Philip, W., Junr.	3	S.S. Thermopylae.
Reynolds, R., R.N.R.	2	S.S. Norman.
Sargent, A. H.	12	Pleione.
Scott, G. P., F.R.Met.Soc. ...	15	Buckingham.
Smyth, Comr. M. H., R.N. ...	8	H.M.S. Egeria.
Squares De Carteret, W. G. ...	8	S.S. Minia.
Thomas, H. G., R.N.R. ...	8	S.S. Yarrawonga.
Thomas, W.	1	S.S. Templemore.
Trenaman, R. W.	5	S.S. Lassell.
Trott, S., F.R.Met.Soc. (The late)	37	S.S. Minia.
Turner, A. C., R.N.R.	4	S.S. Britannia.
Tyson, J.	2	S.S. Moor.
Veale, E. A.	3	S.S. Ormuz.
Wade, W. J.	1	Barque Loch Sloy.
Wadsworth, F. H.	1	S.S. Ethiopia.
Walker, H., R.N.R.	22	S.S. Campania.
Watson, Sub-Lieut. H. C., R.N.	5	H.M.S. Egeria.
Waugh, Lieut. A., R.N. ...	4	H.M.S. Penguin.
Wilson, J., R.N.R.	18	S.S. Anchoria.
Worcester, W. D. G., R.N.R. ...	12	S.S. India.

APPENDIX II.

LIST of METEOROLOGICAL LOGS and DOCUMENTS received from SHIPS.

Captain's Name.	Ship.	Voyage.	Year.	Officers who have assisted in keeping the Meteorological Log.
Alford, F.	S.S. Monarch ...	Off British Isles	1897–99	Messrs. Hart, Broadbridge, and Bordeaux.
Alsop, J. J.	Barque Brussels ...	Napier (N.Z.) and Portland (Oregon) ...	1897–98	———
Angus, T. S.	S.S. Britannia ...	Sydney, viâ Suez	1898	R. P. Stevenson, 2nd Officer, Cecil Brooks, 3rd Officer, and A. G. Mead, 5th Officer.
,, ,, ...	,, ...	,, ,, ...	1898	J. H. Brady, 3rd Officer, G. A. Weston, 4th Officer, and A. G. Mead, 5th Officer.
Barker, D. W., R.N.R....	Training Ship Worcester.	Off Greenhithe	1898	The Cadets.
Barron, H.	Ship Evesham Abbey	New York, Rangoon, San Francisco, Algoa Bay and Bombay.	1896–98	———
Baxter, John	Ship Brenhilda ...	Honolulu and Portland (Oregon) ...	1897–98	———
Bertie, J. L.	S.S. American ...	New Orleans...	1898	2nd, 3rd, and 4th Officers.
,, ,, ...	,, ...	,, ,, ...	1898–99	,, ,, ,,
Boothby, G. C.	S.S. Heraclides ...	River Plate	1898	J. P. Hall, 2nd Officer, and J. MacMillan, 3rd Officer.
Brackenbury, W. J. ...	S.S. Atlas	Calcutta, viâ Suez	1898	———
Bright, H.	Ship Hornby Castle...	Adelaide, Portland (U.S.)	1897–98	———
Burton, George... ...	S.S. Rangatira ...	Wellington, viâ Cape of Good Hope, and home viâ Cape Horn.	1898	———
,, ...	,, ...	Wellington, viâ Cape of Good Hope, and home viâ Cape Horn.	1898	G. Dickson, V. Barnsdale, and Z. Stoton.
Carey, F.	S.S. Lake Huron ...	Quebec	1897	———
,, ,, ...	S.S. Lake Superior ...	Halifax	1898	———
,, ,, ...	S.S. Lake Ontario ..	Quebec	1898	———
Casey, Robert	Barque Annazona ...	Melbourne and Antofagasta	1897–98	D. Reid, 2nd Mate.

Cattrell, Charles ...	Ship Loch Lomond ...	Melbourne	1897-98	——
Chamberlin, W. C. ...	Ship Narcissus ...	Singapore	1898	——
" " ...	" " ...	Singapore to Albany	1898	——
Clarke, W. H.	S.S. Nomadic ...	New York	1898	G. R. Metcalfe, 2nd Officer, assisted by A. H. Lawson, 3rd Officer, and A. P. Freeman, 4th Officer.
" "	" ...	"	1898	O. L. Beck, J. Keamey, A. J. Lawson, A. J. Pawley, and G. R. Metcalfe.
" "	S.S. Tauric	"	1898-99	A. Holme, 2nd Officer, assisted by Mr. Barber, 3rd Officer, and Mr. Robinson, 4th Officer.
Clinock, T. C.	S.S. Harlech Castle ..	Cape Ports and Mauritius	1898	H. M. Cruise, J. Holl, H. B. Ries, and J. Withers.
" "	" " ...	" Tamatave, and Mauritius ...	1898	Messrs. Cruise, Holl, Piers, and Liadert, 1st, 2nd, 3rd, and 4th Officers.
Constantine, Thomas ...	S.S. Don	West Indies	1897-98	T. Blay, 3rd Officer, W. Bilton, 4th Officer, and [illegible] Officer.
" " ...	S.S. Orinoco	" "	1898	J. Gai[illegible] J. Watts, 4th Officer. and [illegible], 5th Officer.
" " ...	"	" "	1898	Mr. P[illegible]sisted by W. Jonish, 3rd [illegible]. Watts, 4th Officer.
Corner, F. W.	S.S. Macquarie ..	Sydney, viâ Cape	1897-98	F. Groves, 1st Officer, Thomas Taylor, 2nd Officer, H. K. Hole, 3rd Officer, and F. L. Tucker, 5th Officer.
Cox, S. G.	S.S. Rotherfield ...	Newport News, Philadelphia, New York, and Tampico.	1898	Edward A. Alcide, 1st Officer, and W. J. Ingram, 2nd Officer.
Crewe, Edward... ...	S.S. Victoria	Melbourne, viâ Suez	1898	W. Hayward, Chief Officer, S. Finch, 2nd Officer, D. Asbury, Sup. 2nd Officer, T. G. Smith, 3rd Officer, and T. F. Warren, 5th Officer.

Crewe, Edward... ...	S.S. Victoria	Sydney, viâ Suez	1898	W. Hayward, R.N.R., H. G. Evans, R.N.R., S. Finch, R.N.R., C. M. Redhead, R.N.R., C. Hudson, R.N.R., and W. Warren, R.N.R.
„ „	„	„ „	1898–99	W. Hayward, R N.R., Chief Officer, S. Finch, R.N.R., and D. Asbury, 2nd Officers, C. C. Smith, 3rd Officer, W. R. Warren, 4th Officer, and G. Morris, 5th Officer.
Crotty, F. H.	Ship Evesham Abbey	Calcutta and New York	1895–96	——
Dart, L. C.	Ship Alcides	San Francisco	1898–99	G. J. Ross, 1st Mate, W. Williams, 2nd Mate, and E. Suliman, 3rd Mate.
Davies, E. H.	S.S. Heraclides ...	River Plate	1897–98	J. P. Hall, 2nd Officer, and W. McMillan, 3rd Officer.
„ „	„ ...	„	1898	J. P. Hall, 2nd Officer, and J. McMillan, 3rd Officer.
„ Herbert ...	S.S. La Plata... ...	Brazil	1897–98	A. F. Smith, 2nd Officer, L. G. Tebbs and C. Durette, 3rd Officers, and V. Lloyd, 4th Officer.
„ „ ...	„	East Coast of South America	1898	A. F. Smith, 2nd Officer, R. A. Ellis, 3rd Officer, C. W. Stevens, 4th Officer.
„ J. A.	S.S. Oanfa	China and Japan, viâ Suez	1898	G. R. Stratford, 3rd Officer.
„ „	„ ...	„ viâ Suez	1898	W. C. Davidson, 1st Officer, J. Metcalfe, 2nd Officer, and W. E. Searle, 3rd Officer.
Dawson, W.P., R.N. ...	H.M.S. Waterwitch...	Sydney, Thursday Island, Hong-Kong, Wei-hai-wei.	1898	Philip de la Garde, Assistant Paymaster, and J. Taylor, J. Featherstone, J. R. Bowering, P.O's. 1st class, A. King, G. Britton, P.O.'s 2nd class.
Dickinson, L. R. ...	R.M.S. Danube ...	East Coast of South America	1898	J. H. Bennett, H. J. B. Popplewell, and J. B, Band.
Docherty, H.	Barque Tinto Hill ...	New York, Melbourne, Manilla, Calcutta, and Boulogne.	1897–98	E. A. Dent, 2nd Officer.

LIST of METEOROLOGICAL LOGS and DOCUMENTS received from SHIPS—*continued.*

Captain's Name.	Ship.	Voyage.	Year.	Officers who have assisted in keeping the Meteorological Log.
Dodd. W. M.	S.S. Port Chalmers ...	Australia, viâ Cape Good Hope, and Monte Video.	1898	J. A. Johnson, 2nd Mate.
Dulling, George ...	S.S. Port Adelaide ...	China and New York, viâ Suez	1897–98	———
„ „ ...	„ „ ...	New York, Amsterdam, and Buenos Aires	1898	———
Dupen, P. P.	S.S. Biafra	West Coast of Africa	1898	J. M. Draper, 2nd Officer.
„ „	„	„ „	1898–99	Do. Do.
„ „	S.S. Cabenda	„ „	1898	J. M. Draper, 2nd Officer, L. Bakewell, 3rd Officer.
„ „	„	„ „	1898	J. M. Draper, 2nd Officer.
„ „	„	„ „	1898	G. H. Cockeram.
Dyke, H. W.	Ship Rathdown ...	Newcastle (N S.W.), San Francisco, and Callao.	1896–98	Messrs. Hall and Dyke, 1st and 2nd Mates.
England, Thomas ...	Barque Glen Grant ...	Quebec, Rio Janeiro, and Apalachicola ...	1897–98	———
„ „ ...	„ „ ...	Curacoa, Apalachicola, and Bermuda ...	1898-99	———
Evans, Charles	S.S. Lake Huron ...	Quebec	1897	———
„ J. E.	S.S. Wolf	Santos	1898	Richard D. Coffey and Leonard Gibbs.
Field. A. M., R.N. ...	H.M.S. Penguin ...	Suva and Hobart	1897–98	Lieut. C. R. W. Brewis, R.N., assisted by Lieuts. F. C. Pasco, A. Waugh, G. Nares, A. Lowis ; F. Payne, Boatswain ; T. Dinham, A. Lutchford, C. Day, and G. Bailey, P.C.'s 1st Class.
„ „ „ ...	„ ...	At Australian Station	1898	Lieuts. F. C. C. Pasco, A. Waugh, G. Nares, A. Lowis, C. R. W. Brewis ; F. Payne, Boatswain ; J. Strickland, T. Dinham, A. Lutchford, G. Bailey, and G. Anstis, P.O.'s 1st Class.
„ „ „ ...	„ ...	South Pacific	1898	Lieut. C. R. Brewis, R.N., and Mr. F. Payne, Boatswain, R.N.

Fraser, W. D.	Ship Corolla	Cape Town, Sydney, Taltal, and Baltimore	1897–98	———
Free, Thomas, R.N.R. ...	R.M.S. Miowera ...	Sydney, Wellington, Suva, Honolulu, and Vancouver.	1897–98	William Macfarlane, 3rd Officer.
Gadd, C....	S.S. Valetta	Calcutta, viâ Suez	1898	C. Dayas, 3rd Officer, M. Dowling, 4th Officer, and E. A. Farnall, 2nd Officer.
Gedge, H. J., Lieut. and Comr., R.N.	H.M.S. Stork... ...	Malta, Aden, Mauritius, Madagascar, and Mussowa.	1897–98	Sub-Lieut. H. P. Douglas, R.N.
Gifford, H. C.	S.S. Amber	At Aden, Perim, and Zanzibar	1897–98	J. Hunter, 1st Officer, D. P. Morrell, 2nd Officer, and W. F. R. Mist, 3rd Officer.
„ „	„	At Zanzibar and Suez	1898	J. Hunter, Chief Officer. D. P. Morrell, 2nd Officer, W. F. R. Mist, 3rd Officer, and A. J. Evans, extra 3rd Officer.
„ „	„	Suez, Malta, and Alexandria	1898	J. Hunter, Chief Officer, D. P. Morrell, 2nd Officer, and W. F. R. Mist, 3rd Officer.
Goudge, Edwin... ...	Ship Naworth Castle	Cape Town, Bassein, and Natal	1897–98	P. H. G. Wright, 3rd Officer.
Griffin, E. J., R.N.R. ...	R.M.S. Moor	Cape Town	1898	H. D. Watts-Russell, 2nd Officer, W. A. Swiney, 3rd Officer, A. W. Bennett, 4th Officer.
„ „ „ ...	„	„	1898	A. W. Bennett, 4th Officer.
Haddock, H. J., R.N.R.	R.M.S. Britannic ...	New York	1898	S. A. Anning, 2nd Officer, assisted by J. Kynaston and A. H. Summers.
„ „ „	„ ...	„	1898–99	A. S. Anning and G. R. Metcalfe, 2nd Officers, assisted by R. Learmouth, 3rd Officer, and V. Hickson, 4th Officer.
Hamon, J. J.	S.S. Tekoa	Wellington, viâ Cape Good Hope, and home viâ Cape Horn.	1898	H. C. Barnes, 2nd Officer, H. E. N. Whitehead, 3rd Officer, and S. Porter, 4th Officer.
„ „	S.S. Waimate... ...	Wellington, viâ Cape Horn	1898–99	A. Forbes, 2nd Officer, G. Hallett, 3rd Officer, and P. T. Perkins, 4th Officer.

LIST of METEOROLOGICAL LOGS and DOCUMENTS received from SHIPS—*continued.*

Captain's Name.	Ship.	Voyage.	Year.	Officers who have assisted in keeping the Meteorological Log.
Hay, C. W.	R.M.S. Warrimoo ...	Sydney, Wellington, Suva, Honolulu, and Vancouver.	1898	G. M. Hammon, A. H. Reed, and W. Ellis, 2nd, 3rd, and 4th Officers.
Hemming, F. A. ...	R.M.S. Miowera ...	Suva, Wellington.	1898	R. Bailey, 3rd Officer.
Hepworth, M. W. C., R.N.R.	R.M.S. Aorangi ...	Suva, and Sydney	1898	S. Philipe, 1st Officer, R. M. Reader, 2nd Officer, F. J. Bayldon, 3rd Officer, and S. Pearson, 4th Officer.
Inskip, H. E.	R.M.S. Ormuz ...	Sydney, viâ Suez	1898	G. H. Jones, assisted by E. J. Taylor and M. B. Sayer.
Jaggard, Russell ...	S.S. Waimate ...	Wellington, viâ Cape Good Hope, and home, viâ Cape Horn.	1898	——
" " ...	" ...	Port Chalmers, viâ Cape Good Hope ...	1898	A. Forbes, 2nd Officer, G. Hallett, 3rd Officer, and P. T. Perkins, 4th Officer.
James, E. G.	Ship Airlie	Melbourne and Taltal (Chile)	1897–98	H. F. B. Gape, 1st Officer, and H. E. Jackson, 2nd Officer.
Johnston, J., R.N.R. ...	S.S. Goorkha	Calcutta, viâ Suez	1898	F. W. Trigga, Chief Officer, J. Middleton, 2nd Officer, and F. Johnson, 3rd Officer.
Jones, T. J., R.N.R. ...	S.S. Bovic	New York	1898	W. Durack Molony.
Kelly, R.	Ship Westland ...	Cape Town, Otago, Sydney and Lyttleton	1897–98	J. Samuels, Mate, and H. Reynolds, 3rd Mate.
Kempson, C. H. ...	S.S. Ionic	Cape Town, New Zealand, Rio Janeiro, viâ Cape Horn.	1898	J. C. Hamilton and E. Kemp, 3rd and 4th Officers.
" " ...	"	Do. do. do.	1898–99	Do. do.
Lewis, J.	S.S. Lassell	Victoria (Brazil) and New York	1898	F. R. James, 2nd Officer.
"	"	Rio Janeiro and New York	1898–99	Do. do.
Lobb, F.J., R.N. ...	L.H. Tender Richmond	Nassau and Bermuda	1897–98	F. W. Holden, Chief Officer.

Lourison, G. M. ...	Ship Eaton Hall ...	San Francisco, Puget Sound, and Melbourne.	1896–98	Messrs. Commerford, Montadon, and Farquhar, 1st, 2nd, and 3rd Officers.
Lowe, James	S.S. Duffield	Philadelphia	1897–98	F. A. White, 1st Mate.
" "	" ...	"	1898	Do. do.
McKay, Horatio, R.N.R.	S.S. Lucania	New York	1897–98	J. T. W. Charles, R.N.R.
" " "	"	"	1898	Do. do. and A. H. Reade, R.N.R.
Martin, W., R.N.R. ...	R.M.S. Mexican ...	Cape Town	1898–99	Hugh Lockyer, R. M. Pope, and F. Girdler Brown.
Martyr, J. W. C. ...	S.S. Europa	Colon, Genoa, and Boston	1897–98	P. R. Brining, 3rd Officer.
Miller, A. T., R.N. ...	School Ship Conway		1898	The Cadets.
Millican, J. W.	S.S. Loughrigg Holme		1897–98	E. Russell and E. S. Gibson, 1st and 2nd Officers.
" " ...	" "	Montreal, Sulina, and Savannah	1898	E. Russell, D. S. Turnay, and W. S. Hodgson.
Milne, W. F.	S.S. Eclipse	Davis Strait	1898	
Milner, W. H.	S.S. Atrato	West Indies	1897–98	Charles Garden, 4th Officer.
" "	"	"	1898	
" "	"	"	1898	
Milward, C. A., R.N.R.	S.S. Mataura... ...	Cape Town, New Zealand, and Monte Video.	1897–98	E. G. T., 2nd Officer.
Mitchell, George ...	S.S. California ...	New York and Mediterranean	1897–98	M. Weir, 3rd Officer.
" ...	" ...	Mediterranean Ports and New York ...	1898	Mr. McNeil.
Mitchell W. T. (Chief Officer).	Ship Wasdale ...	Portland, Oregon	1897–98	
Moseley, F. J., R.N.R....	S.S. Goorkha... ...	Cape Town	1898–99	E. L. Travers, Chief Officer, W. M. Betts, 2nd Officer, T. A. Jones, R.N.R., 3rd Officer, W. Haywood, 4th Officer.
Murdoch, Peter... ...	Ship Sierra Lucena ...	Mauritius, Rangoon, Rio de Janeiro and Chittagong.	1897–98	G. Hopper, Apprentice.
Murray, J. A.	S.S. Milwaukee ...	New Orleans...	1898	Messrs Tonge and Ward, 2nd and 3rd Officers.

LIST of METEOROLOGICAL LOGS and DOCUMENTS received from SHIPS—*continued.*

Captain's Name.	Ship.	Voyage.	Year.	Officers who have assisted in keeping the Meteorological Log.
Nasbet, J. R., R.N.R. ...	S.S. Elphinstone ...	Borneo, Singapore and Hong-Kong ...	1897–98	W. W. Sharpley, 1st Officer, D. G. Taylor, 2nd Officer, and Albert Dransfield, 3rd Officer.
„ „ „ ...	S.S. Sabine Rickmers	In China Sea...	1898	T. Powell, 1st Officer, and Albert Dransfield, 2nd Officer.
Norman, Francis ...	S.S. Indravelli ..	Calcutta, New York, and Yokohama, viâ Suez.	1897–98	C. F. Beresford and N. C. Russell.
Osborne, C. F., R.N.R.	S.S. Persia	Calcutta, viâ Suez	1898	H. Thistle, S. B. Dobson, and A. J. Paulesen.
Parry, J. F.	H.M.S. Dart	At Australian Station	1898	A. O. Bobardt, Surgeon, assisted by Edward Brassington, Charles Lloyd, George Ball, and Noah Smith.
Pattman, R.	Barque Loch Torridon	Melbourne	1898	John A. Robson, 1st Mate, and Robert Craig, 2nd Mate.
Peebles, R.	S.S. Breconshire ...	Philadelphia and Japan, viâ Suez ...	1898–99	Messrs. Elliott, Matthews, and Owens.
Philip, William, Junr.	S.S. Thermopylæ ...	Sydney, viâ Cape Town	1898	W. Douglas, Chief Officer, J. Paterson, 2nd Officer, W. M. Jermyn, 3rd Officer.
„ „ „	„ ...	„ „	1898–99	W. Douglas, J. Paterson, W. M. Jermyn, and E. Legge.
Potter, R.H.	Barque Alliance ...	Brisbane and Valparaiso	1897–98	G. Jones, 1st Mate, and W. Griffiths, 2nd Mate.
Rees, John	S.S. Norseman ...	Boston	1898–99	J. Davies, 2nd Officer, and J. T. Hatton, 3rd Officer.
Reeves, I.	S.S. Australia ...	Sydney, viâ Suez	1898	J. A. Legge, Supernumerary 2nd Officer.
„	„ ...	„ „	1898–99	Do. do.

Reynolds, R., R.N.R. ...	S.S. Norman	Cape Town	1898	J. V. Williams, 1st Officer, W. M. Godfrey, 2nd Officer, A. W. Pearse, 3rd Officer, C. E. Mumford, 4th Officer. D. E. Easton and H. B. Harvey, 5th Officers.
„ „	„	„	1898	J. P. Williams, 1st Officer, W. M. Godfrey, 2nd Officer. A. W. Pearse, 3rd Officer, and C. E. Mumford, 4th Officer.
Robinson, E. R., R.N.R.	S.S. Goorkha... ...	Calcutta, viâ Suez	1898	F. W. Triggs, Chief Officer, J. Middleton, 2nd Officer, and F. Johnston, 3rd Officer.
Sargent, A. H.	Ship Pleione	Auckland	1897	G. H. B. Wood, Chief Officer, and J. Middleton, 2nd Officer.
Scott, George P., F.R. Met. Soc.	Ship Buckingham ..	New York and Shanghai	1897–98	W. Bourke, Chief Officer, and J. Maudesley, 2nd Officer.
„ „	„ ...	New York, Shanghai, and Tacoma.	1898	Do. do.
Singer, P. R.	S.S. Den of Airlie ...	Kurrachee, viâ Suez	1898	James Strachan.
Smyth, Comr. M. H., R.N.	H.M.S. Egeria ...	Esquimalt and Vancouver	1898	Sub-Lieut. H. C. Watson, R.N., and Quartermasters.
„ „	„ ...	Off Vancouver	1898	Do. do.
Squares De Carteret, W. G.	S.S. Minia	Halifax	1898	J. Adams, Navigating Officer, E. Williams, 2nd Officer, and J. Jeffries, 3rd Officer.
„ „	„	East Coast of North America	1898–99	James Adams, Navigating Officer, W. Williams, 2nd Officer, and J. Jeffries, 3rd Officer.
Stephens, T.	S.S. Catalonia ...	Boston	1897–98	———
Thomas, H. G.	S.S. Yarrawonga ...	Batavia and Brisbane, viâ Suez, and home, viâ Cape Good Hope.	1898	F. Owen, 2nd Officer, G. Free, 3rd Officer, and P. Logan, 4th Officer.
„ William ...	S.S. Templemore ...	Baltimore	1898	W. McDonald, 1st Officer, A. McKenny, 2nd Officer, and J. Greig, 3rd Officer.

LIST of METEOROLOGICAL LOGS and DOCUMENTS received from SHIPS—*continued.*

Captain's Name.	Ship.	Voyage.	Year.	Officers who have assisted in keeping the Meteorological Log.
Thomson, W. S. ...	S.S. Macduff	China and Japan, viâ Suez	1898–99	Robert Logan, 2nd Officer.
Trenaman, R W. ...	S.S. Lassell	Bahia, Rio Janeiro and New York ...	1893	R. J. Kite, 2nd Officer.
Trott, Samuel (The late)	S.S. Minia	East Coast of North America	1898	W. G. Squares de Carteret, Chief Officer, J. Adams, Navigating Officer, E. Williams, 2nd Officer, and J. Jeffries, 3rd Officer.
,, ,, ...	,, ...	,, ,, ...	1898–99	Do. do.
Turner, A. C., R.N.R. ...	S.S. Britannia ...	Bombay, viâ Suez	1898	
,, ,, ,, ...	,, ...	,, ,, ...	1898	James Young, 2nd Officer.
,, ,, ,, ...	,, ...	,, ,, ...	1898	
Tyson, J.	R.M.S. Moor	Cape Town	1898	A. W. Bennett, 4th Officer.
,, ,, ...	,, ...	,, ...	1898–99	Do.
Veale, E. A.	S.S. Lusitania ...	Sydney, viâ Suez, and home, viâ Cape Town.	1897–98	A. D. Barff.
,, ,, ...	S.S. Ormuz	Sydney, viâ Suez	1898	G. H. Jones, B. N. Gace, C. Nicholson, and W. G. Cullimore.
,, ,, ...	,, ...	,, ,, ...	1898	B. N. Gace, Chief Officer, C. Nicholson, 2nd Officer, G. H. Jones, 3rd Officer, and W. Cullimore, 4th Officer.
Wade, W. J.	Barque Loch Sloy ...	Adelaide	1897–98	J. McMillan, Chief Officer, and G. Twidale, 2nd Officer.
Wadsworth, F. H. ...	S.S. Ethiopia... ...	New York	1898	W. B. Rome, 4th Mate.
,, ,, ...	,, ...	,, ...	1898	T. G. Keane, 4th Officer.
Walker, Alexander ...	Barque Jordan Hill...	Sydney, Tacoma, and Queenstown ...	1897–98	James Smith, 2nd Officer.
Walker, H.	R.M.S. Campania ...	New York	1898	C. A. Smith, F. W. Hankinson, H. Nelson, and W. Woolley.

Williams, J. O.... ...	S.S. Norseman ...	Boston	1897–98	Thomas James, 2nd Officer.
" "	" ...	"	1898	J. Davies, 2nd Officer, and J. T. Hatton, 3rd Officer.
Wilson, John, R.N.R. ...	S.S. Anchoria ...	New York	1898	David Kinnear, 3rd Officer.
" " ...	" ...	"	1898–99	D. Pearson. 3rd Officer.
Wood, G. H. B.... ...	Ship Pleione	Auckland	1898	F. W. Bollens, Chief Officer, and J. Middleton. 2nd Officer.
Worcester, W. D. G., R.N.R.	S.S. India	Sydney, viâ Suez	1898	C. Chief Officer, [illegible], 2nd Officer, [illegible]ap. 2nd Officer, [illegible] 3rd Officer, E. P. W. Stroud, R.N.R., 4th Officer, R. A. Harden. 5th Officer.
" "	"		1898	A. W. Officer, E. B. Officer, R. W P. W. Stroud, R.N.R., 4th Officer, B. A. Harden, 5th Officer, and H. W. M. Atkinson, Sup. 2nd Officer.
" "	" ... ... "		1898–99	C. C Talbot, E. B. Bartlett, A. A. Mellin, T. W. Bennett, and B. B. Hetherington.

APPENDIX III.

INSTRUMENTS supplied, &c., to the Royal Navy.

Per Account.	Barometers.	Aneroids.	Thermometers.				Hydrometers
			Ordinary.	Max.	Min.	Screens.	
April 1st, 1898, afloat ...	235	615	1,462	389	391	238	63
Issued since	83	160	343	114	95	45	1
	318	775	1,805	503	486	283	64
Returned since	83	141	414	88	83	50	19
April 1st, 1899, afloat ...	235	634	1,391	415	403	233	45

INSTRUMENTS supplied, &c., for use at Naval Stations.

April 1st, 1898, in use ...	74	79	247	34	46	10	11
Issued since	3	11	33	2	9	—	—
	77	90	280	36	55	10	11
Returned since	2	7	28	2	1	—	—
April 1st, 1899, in use ...	75	83	252	34	54	10	11

DISPOSITION of ADMIRALTY INSTRUMENTS on April 1st, 1899

Afloat in Royal Navy ...	235	634	1,391	415	403	233	45
In use at stations	75	83	252	34	54	10	11
In store at M.O.	68	146	215	101	115	41	32
,, Chatham	14	52	98	27	29	17	15
,, Sheerness ...	7	13	39	15	15	10	6
,, Portsmouth ...	22	52	154	51	54	26	4
,, Devonport ...	18	35	145	44	48	19	16
,, Queenstown ...	3	2	13	3	3	—	4
,, Gibraltar... ...	2	2	7	3	3	—	4
,, Malta	12	15	59	9	7	2	6
,, Bombay	4	7	15	6	6	2	4
,, Halifax	3	4	18	3	1	1	7
,, Bermuda ...	7	12	13	2	8	2	—
,, Jamaica	4	5	18	—	1	1	3
,, Cape of Good Hope	4	5	27	7	7	3	4
,, Trincomalee ...	3	5	21	5	6	1	4
,, Hong Kong* ...	5	17	18	10	11	2	21
,, Coquimbo ...	3	5	19	4	4	1	19
,, Sydney	5	7	34	2	3	2	2
,, Esquimalt ...	3	3	8	2	6	2	4
Total April 1st, 1899 ...	497	1,104	2,564	743	784	375	211
Lost, &c., since April 1st, 1898	—	6	236	38	22	38	6
Under repair, April 1st, 1899	19	6	—	—	—	—	—

* No Return since Jan. 1st., 1899.

APPENDIX IV.

INSTRUMENTS supplied, &c., to Mercantile Marine.

Per Account.	Barometers.	Compasses.	Thermometers.				Hydrometers.
			Ordinary.	Max.	Min.	Screens.	
April 1st, 1898, afloat ...	118	—	715	—	1	107	400
Issued since	54	—	321	—	—	43	178
	172	—	1,036	—	1	150	578
Returned since	59	—	330	—	1	46	179
April 1st, 1899, afloat ...	113	—	706	—	—	104	399

INSTRUMENTS at Stations, viz., Telegraphic Reporting Stations Observatories, Fishing Villages, &c.

April 1st, 1898, in use ...	302	2	292	64	68	58	10
Issued since	19	2	22	5	5	4	8
	321	4	314	69	73	62	18
Returned since	11	2	24	8	2	4	8
April 1st, 1899, in use ...	310*	2	290	61	71	58	10

DISPOSITION of INSTRUMENTS on April 1st, 1899.

In merchant ships	113	—	706	—	—	104	399
„ use at stations	310*	2	290	61	71	58	10
„ store at M.O.	37	3	117	16	25	51	129
At Liverpool Agency ...	8	—	38	—	—	7	23
„ Glasgow „ ...	6	—	37	—	—	3	11
„ Dundee „ ...	5	—	27	—	—	5	21
„ Hull „ ...	4	—	12	—	—	4	15
„ Cardiff „ ...	9	—	47	—	—	4	30
„ Southampton „ ...	5	—	28	—	—	5	12
Total, April 1st, 1899 ...	497	5	1,302	77	96	241	650
Lost, &c., since April 1st, 1898	5	3	115	4	—	16	44
Under repair, April 1st, 1899	3	—	—	—	—	—	—

* Of these barometers 220 are lent for use of seafaring communities at fishing villages and ports.

APPENDIX V.

REPORT OF INSPECTION OF IRISH AND WELSH STATIONS, 1898.

I have to report that I have completed the inspection of the stations in Ireland and Wales. I have omitted several stations where there appeared to be no pressing demand for a visit. These were Roche's Point, a telegraphic reporting station, and six of the Weekly Weather Report stations.

Newcastle, Co. Wicklow, visited September 24th.—The observations at this station, the Consumption Hospital for Ireland, have now commenced. The instruments were in good order. The observer, Dr. Steede, was absent on vacation, but his *locum tenens*, Dr. Rutherford, seemed very capable of keeping the records.

Kingstown, visited September 26th.—Observations have been commenced at the People's Park, but as yet the outfit is incomplete. I hope, however, for improvement ere long.

Dublin, Fitzwilliam Square, visited September 26th.—This station was in its usual excellent order, except that the site is too confined, as mentioned in previous reports.

Dublin, Glasnevin Gardens, visited September 26th.—I found observer ill in hospital. His son took his place and appeared efficient, except that he had allowed the mounting of the wet bulb to get dry.

Donaghadee, visited September 27th.—The instruments are clean and in good order. The observer is no longer Postmaster, and the question of his remuneration requires attention.

Lissan, visited September 28th.—This station is in good condition. Its permanence seems doubtful owing to the very advanced age of Sir N. Staples.

Malin Head, visited September 30th.—This station was in very good order.

Edenfel, Omagh, visited October 1st.—This station is also very satisfactory; the reports appear in the Weekly Weather Report.

Markree, visited October 3rd.—The observer here is new, Mr. F. W. Henkel, F.R.A.S., having succeeded the late Dr. Marth. The instruments were clean and in good order.

Belmullet, visited October 5th.—The instruments were clean, but I had to speak severely to the observer about carelessness in sending off reports, a serious defect in such an important station. There is great difficulty in finding thoroughly competent observers at outlying stations.

Mount Callan, Inagh, Co. Clare, visited October 7th.—This is a new rain station; Colonel Tottenham does not, as yet, take any other observations. The rain gauge is well exposed.

Fenloe, Newmarket-on-Fergus, Co. Clare, visited October 8th.—The observer, Major Hickman, R.A., observes rain, and has also other instruments, but not verified. It is possible that he may take fuller records.

Valencia, visited October 11th.—The instruments are in good order. The fence along the road, which I mentioned last year, is still in bad condition, and is decidedly worse than the average fences close by on the road.

Parsonstown, visited October 13th.—The instruments are in good order. One of the observers, Haines, is probably about to leave. I saw another boy, Thos. Colvin, who will replace him, and who appears intelligent, and is careful, by Dr. Boeddicker's report.

Kilkenny, visited October 14th.—The station is in good order, and Mr. Carlton is very careful.

St. David's, visited October 15th.—This station was, as usual, in excellent order.

St. Ann's Head, visited October 17th.—I found everything in good order.

Corrections for Thermometers.

Stations.	Inspector's Standard.	Dry Bulb.	Wet Bulb.	Max. Thermometer.	Min. Thermometer.	Grass Min.	Spare Thermometer.	Remarks.
	°	°	°	°	°	°	°	
Belmullet	57·4	−0·6	−0·6	−0·4	+0·4	—	—	
Donaghadee ..	55·0	−0·4	−0·7	−0·1	0·0	—	—	
Dublin (City) ..	61·3	−0·6	−0·6	−0·8	0·0	—	—	
Glasnevin	56·0	−0·8	−0·5	−0·1	+0·1	0·0	—	
Kilkenny	52·9	—	—	−0·1	−0·1	—	—	
Kingstown ..	57·1	−0·9	−0·9	−1·0	−0·7	—	—	
Lisaan	54·2	−0·5	−0·6	−0·3	+0·3	—	—	
Malin Head ..	52·0	−0·6	−0·5	−0·5	−0·2	—	−0·3	
Markree Castle ..	59·2	−0·1	−0·1	−0·6	+0·5	—	—	
Newmarket-on-Fergus.	59·2	−0·8	−0·8	—	—	—	—	
Newcastle (Co. Wicklow).	60·0	−0·5	−0·6	+0·2	+0·2	—	—	
Omagh (Edenfel)	52·0	—	—	−0·1	−0·1	—	−0·6	
Parsonstown ..	53·7	−0·4	−0·2	−0·3	−0·2	—	—	
St. Ann's Head ..	53·3	−0·8	−0·1	−0·7	−0·6	—	−0·5	
St. David's ..	53·2	−0·5	−0·5	+0·2	−0·1	0·0	—	
Valencia (Cahirciveen).	53·8	−0·7	−0·7	−0·5	−0·1	—	—	

Robert H. Scott.

Report of Inspection of Scottish Stations, 1898.

Barometers.

The barometers of the stations were compared with inspector's standard No. 690, which was in good order during the inspection till it was accidentally broken at the time of the inspection of the station in Edinburgh. All the barometers were correct and kept in the same good order as on previous years. As regards the barometer at the Edinburgh station, it will be compared when a barometer has been received from the Office for purposes of inspection.

Table I. shews the comparisons with No. 690, the readings of the station barometer not being corrected.

Table I.

Stations.	Inspector's Standard No. 690 corrected.	Reporting Barometer uncorrected.	Check Barometer uncorrected.	Remarks.
	Inches.	Inches.	Inches.	
Ochtertyre	29·587	29·577	—	
Ardrossan	29·916	29·914	29·914	
Rothesay	29·860	29·864	—	
Poltalloch	30·005	29·980	—	
Laudale	29·963	29·970	29·970	Check barometer corrected to height of reporting barometer.
Fort William .. .	29·708	29·719	—	
Fort Augustus	29·854	29·854	—	
Nairn	30·078	30·082	30·072	
Stornoway	30·242	30·243	30·250	
Lairg	29·845	29·830	—	
Dunrobin	30·340	30·341	—	
Deerness	30·092	30·115	—	
Dunrossness	29·822	29·823	29·828	Check instrument in shop at lower level.
Wick	29·983	29·983	30·034	
Cullen	—	-	—	A Fitz-Roy barometer only here.
Aberdeen	29·700	29·706	29·704	
Dundee	29·460	29·460	—	
Marchmont	29·496	29·510	—	
Ladylaw	29·762	29·736	—	
Wolfelee	29·618	29·620	—	
Leith	30·363	30·362	30·362	
Edinburgh	*	29·908	—	* Inspector's barometer broken.

Thermometers.

Two readings of the thermometers were taken, first by the observer as they hung in the screen, and then by the inspector after they had been in water for the times specified in the table. They were found to be in good order and carefully attended to.

Table II.

Corrections for Thermometers.

Stations.	Inspector's Thermometer, No. 4433.	Dry Bulb.	Wet Bulb.	Spare Thermometer.	Max. Thermometer.	Min. Thermometer.
	°	°	°	°	°	°
Ochtertyre	61·8	0·0	0·0	—	0·0	+0·1
Ardrossan	58·7	−0·3	−0·4	—	0·0	+0·2
Rothesay	60·4	0·0	0·0	—	+0·1	+0·2
Poltalloch	60·0	0·0	0·0	—	−0·1	0·0
Laudale	62·1	−0·1	−0·1	—	0·0	−0·3
Fort William	64·9	−0·3	−0·3	—	−0·1	+0·1
Fort Augustus	59·9	−0·1	−0.1	—	−0·1	+0·3
Nairn	61·4	−0·8	−0·9	−0·2	−0·2	0·0
Stornoway	60·9	−0·6	−0·6	+0·4	+0·3	+0·2
Lairg	62·3	−0·1	0·0	—	+0·1	−0·1
Dunrobin	60·8	0·0	0·0	—	−0·1	+0·1
Deerness	60·9	−0·1	−0·1	—	+0·8	+0·4
Dunrossness	55·5	−0·6	−0·6	−0·2	0·0	−0·3
Wick	58·7	−0·4	−0·5	—	0·0	+0·1
Cullen	59·0	+0·1	+0·1	—	—	—
Aberdeen	58·8	−0·1	−0·1	—	−0·1	−0·1
Dundee	59·6	+0·6	+0·6	—	−1·4	+0·4
Marchmont	54·8	+0·1	+0·1	—	0·0	+0·1
Ladylaw	55·5	0·0	+0·3	—	+0·1	+0·2
Wolfelee	53·2	+0·2	+0·1	—	−0·2	+0·2
Leith	58·8	−0·2	−0·3	—	+0·1	+0·3
Edinburgh	56·7	−0.1	−0·1	—	0·0	0·0

Hygrometers.

As on previous inspections, much attention was given to the state of the dry and wet bulbs which at all the stations were read, as they hang in the screen, immediately when the screen was opened. I have pleasure in reporting that in all cases these thermometers were kept in good order for hygrometrical observations.

NOTES OF INSPECTION OF THE STATIONS.

Ochtertyre, August 1st, 1898.—The instruments continue to be kept in excellent order, and the observations are made correctly and with much intelligence.

Ardrossan, August 8th.—The instruments are well attended, and correctly observed by Mr. Mayes. The assistant observer read the barometer 0·016 inch too low, from a faulty setting of the vernier—a mistake, it may be mentioned, not likely to recur.

Rothesay, August 8th.—The instruments were all in very good order, and the observations are well and intelligently made.

Poltalloch, August 9th.—The observations are carefully made, and the instruments are well kept.

Laudale, August 11th.—The instruments are all in excellent order, and the observations are made carefully and expeditiously.

Fort William, August 12th.—The thermometer screen had just been painted. All the instruments are well attended to, and the observations are made with exactness and fulness.

Fort Augustus, August 13th.—The instruments are in excellent order, and the observations are made correctly and with scrupulous punctuality.

Nairn, August 15th.—The rain gauge has been repaired since last inspection, but the thermometer screen requires repainting. The minimum thermometer was out of order, about a degree of the spirit being lodged near the top of the tube. When pointed out, Miss Penny set it right. Otherwise, the instruments were in good order, and all the observations are well attended to.

Stornoway, August 17th.—I took a new barometer to this station, which, after being some time beside the inspector's standard barometer, was found to be in good order. All the instruments were in very good order, and the observer shews remarkable skill and intelligence in making the observations.

Lairg, August 18th.—The instruments were in good order and the observations are well made. The barometer has been transferred to an adjoining house for a few weeks, and the transference had been very carefully done, as shewn by the comparison with the inspector's standard.

Dunrobin, August 19th.—The instruments continue to be kept in very good order and the observations carefully and intelligently made.

Deerness, August 20th.—The rain gauge had been repaired, and a low, light wooden fence placed round it for protection since last inspection. All the instruments were in excellent order, and much attention and intelligence are bestowed on making the observations.

Dunrossness (Sumburgh Head), August 23rd-24th.—The thermometer screen was a good deal out of repair, parts being quite rotten; the stand, however, was good, but requiring to be repainted. A new screen is required. Otherwise, the instruments were in good order and well attended to, and the observa-

tions are made with great care by all the three observers. Particular attention was given to explain those readings of the barograph which are required to be added to the daily telegraphic report. These will, in future, be added.

Wick, August 25th.—The new thermometer screen requires repainting, and a new bottom is required for the receiver of the rain gauge; both ordered to be done. Otherwise the instruments were in very good order.

Cullen, August 27th.—This place was visited in view of it becoming one of the stations of the Office. The only instruments, however, were a thermometer screen and a dry and wet bulb hygrometer, and there is no probability of other instruments being procured. It is not recommended, in the circumstances, that Cullen be accepted as a station.

Aberdeen, August 29th.—The self-recording rain gauge was removed from its old position and is now placed in the University grounds in the same grass plot as the other instruments. The change was necessitated by the growth of shrubs in too great proximity to it in the old position. The sunshine recorder and all the instruments were in excellent order, and the most scrupulous accuracy and punctuality are shewn in making the observations. I called on the postmaster and the head of the telegraphing department with reference to the late arrivals of the daily telegraphic report on Sundays, who promise to do all in their power to rectify it.

Dundee, August 30th.—All the instruments were in very good order, and much care is given to ensure correctness in the work of observation.

Marchmont, September 30th.—The instruments are in remarkably good order, and the observations continue to be carefully and correctly made.

Ladylaw, September 30th.—The observer, Mr. W. R. Wilson, who was in good health at the time of my inspection in 1896, died suddenly a few days thereafter. His son, Mr. Thomas Wilson, at once began to make the observations, and the state of the instruments and the quality and fulness of the observations shew that the high standard of his father's work of observation will, in his hands, be fully maintained.

Wolfelee, October 1st.—Mr. Cockburn, the late observer, died in the beginning of the year, and the observations were temporarily suspended till Mr. Gordon went to Wolfelee in May. He at once began to observe the thermometers, the rain gauge, and the wind. At the time of my inspection he was taught to read the barometer and to make the other observations required. He promises to be a very good observer. The instruments were all in good order.

Leith, October 5th.—The instruments were all in very good order, and the observations are very carefully made.

Edinburgh, October 7th.—The instruments were in excellent order, and the care and enthusiasm with which the observations have been conducted is continued by the observer. The inspector's barometer was unfortunately broken just before the inspection commenced.

ALEXANDER BUCHAN.

Reports of Inspection of English Stations, 1898.

Report by Mr. F. Gaster.

Newcastle, Second Order Station inspected on September 27th.—Instruments very good, but thermometer screen is on a roof, and is sheltered from sun's rays by a still higher part of the building on its south side. Position for screen on the ground is not obtainable at present.

Cockle Park Tower, near Morpeth, inspected on September 28th.—Instruments excellently placed and easily reached. Exposure of thermometers, rain-gauge, and sunshine recorder as good as can be desired, but a *slight* further adjustment in the azimuth of sunshine recorder seemed necessary. Gave all necessary instructions.

Seaham, inspected on September 29th.—Thermometers and screen have all been removed from the cemetery to a position on the railway platform, near Mr. Aird's office. Exposure good, and instruments read accurately. Observer when away from town is represented by his son.

Durham Observatory, inspected on September 30th.—Everything in good order, but the trees complained of last year as sheltering the sunshine recorder at certain hours had not been lopped, nor were they likely to be till certain structural alterations in the building were completed; these were in progress.

Telegraphic Reporting Stations.

York, inspected on October 1st.—Barometer (marine) in good order, and thermometers agreeing well with inspector's instrument. New dry-bulb required for telegraphic reporting instruments. Sunshine recorder (on roof at Bootham) well exposed, but means of ascent and descent very unprotected and dangerous. Arrangements for recording sunshine in holiday time not satisfactory, and I regret that I could not secure promise of improvement.

Spurn Head, inspected on October 3rd.—Instruments all in good order and carefully read, but drifting of sand over the out-door instruments causes serious trouble to observer.

Corrections for Barometers.

Stations.	Reporting Barometer.	Check Barometer.	Notes.
Newcastle	+·004	There is none	Standard was Adie B. T. 451 throughout.
Morpeth (Cockle Hill Park)	+·003	„	
Durham Observatory ..	+·011	„	
Seaham	+·004	„	
York	+·002	„	
Spurn Head	+·001	−·003	Attached thermometer found broken on reaching station.

Corrections for Thermometers.

Stations.	Dry Bulb.	Wet Bulb.	Maximum.	Minimum.	Spare.	Notes.
	°	°	°	°	°	
Newcastle	−0·5	−0·5	−0·3	0·0	None	No. 3805 used as Standard thermometer throughout.
Morpeth (Cockle Hill Park.)	−0·3	−0·3	−0·1	+0·7	Grass −0·7	
Durham Observatory	−0·2	−0·2	−0·3	+0·3	None.	
Seaham	−0·6	−0·8	0·0	+0·6	+0·6	
York (2nd Order ..	−0·6	−0·6	−0·6	−0·5	None.	
York (Tel. Reporting	..	−0·7	−0·5	−0·5	None	No Dry Bulb.
Spurn Head	−0·5	−0·5	−0·5	−0·5	−0·9	Scale of "Spare thermometer" broken.

Report by Mr. R. H. Curtis.

Telegraphic Reporting Stations.

North Foreland.—I found the instruments at this station in good order, and they appeared to be well attended to. The responsible observer is apparently Coastguard Signalman Heighton, the nominal observer, Mr. Jenkins, junior, being only a lad, about 15 to 16 years of age, and, in my judgment, not fitted to undertake the work; he, however, read the barometer correctly.

Dungeness.—The observer here, Mr. Batten, will probably be shortly removed from this station; there are, however, others of the staff well able to take up the work. The instruments are in good order, but I found the barometer read about ·024 below my standard corrected. I made several sets of comparisons, at considerable intervals, with the same result.

Hurst Castle.—The instruments were in good order, except the rain gauge, which is quite worn out; the rim was, however, circular. It was neither firm nor level, and I therefore moved it slightly, and secured it properly in its new position. The observer did not use his tables for reducing the barometer quite correctly, but otherwise he did the work correctly, if somewhat slowly. The legs of the thermometer screen are quite decayed below ground, and instructions were given for new supports to be fitted to them.

St. Aubins, Jersey.—The observer here is assisted by his son, a lad of 16 or 17 years of age. The position of the instruments—and particularly the rain gauge—is not very good, but no better appears to be available. For observation of wind and of sea disturbance the position is decidedly bad. The instruments were all in good order, and the work seems to be fairly well done.

Prawle Point.—The observer here has very much improved since my last visit, and he is a good deal interested in his work. All the

instruments were in excellent order, and the condition of his wet-bulb left nothing to be desired. The thermometer screen is worn out.

Stations of the Second Order.

Bramley.—The day of my visit was a very hot one, and I found that the top of the thermometer screen—a single top—was quite warm on the inside, notwithstanding that it had been partially protected by a small mat laid upon it. On this occasion the maximum temperature would, without doubt, be too high, and it is a question how far a similar effect may have been produced before, during hot calm days. The instruments were all in good order, but the position of the station in a wooded valley makes it unsuitable for wind observations.

Cooper's Hill.—Everything at this station was in perfect order, and the observations are made with great care. Professor McLeod promised to see whether any arrangements could be made for taking 9 p.m. observations, but he was not very hopeful that he would succeed.

Eastbourne.—The observer had dismounted his wet-bulb before my arrival. The barometer is not in very good order; the vernier pinion is damaged, and the mercury in the cistern a good deal oxidised. I think the observer does his work conscientiously.

Epsom.—The wet-bulb was in a very bad state; there was no muslin on the bulb, but merely a piece of tape tied round the stem close to the bulb, and the water vessel was nearly dry. The grass minimum has a very large error which I failed to reduce.

Parkstone.—The observations here are most carefully made, and the equipment of instruments is very complete. When testing the maximum thermometer I found a curious error; at about 70° its error increased, but at just over 72° the mercury suddenly shot up from 3 to 5 degrees, generally in one, but occasionally in two, quick pulses; the instrument was changed for another.

Plymouth.—This station is now in a very complete condition as regards its equipment of instruments, and the observations appear to be most carefully made. A pressure-tube anemometer has been recently erected on a steel mast at the top of the Smeaton Tower, on the Hoe. A house has also been erected for the barometer, as an office, and above it are placed the sunshine recorder, in an excellent position, and a self-recording wind vane; a Beckley rain-gauge is also at work near the other instruments. All the instruments were in very good condition.

St. Leonards.—There are two stations here, the new one being close to the sea at the extreme western end of the Parade, where the instruments have an excellent exposure; at both stations they were in good order, and the observations are carefully made. The lens of the sunshine recorder was not in good adjustment, and the instrument had to be dismounted to put this right. Unfortunately the lens is not a good one, and is full of striæ, which cause a considerable diffraction of the sun's rays.

Southampton.—Everything at this station was in excellent order.

Watergate (Emsworth).—Since the last inspection a rain-gauge has been added to this station. It was, however, in a very unsatis-

factory position, a suitable site was selected for it, and also for a Stevenson screen, which, I was told, Mr. Christy proposes to obtain. I was asked to specially examine the sunshine recorder at this station. The ball appeared to be a trifle too small for the bowl, but to be properly adjusted within it; but the observer is convinced that it does not give a full record of sunshine. Its position is very good.

Newquay.—The stand of the sunshine recorder here had become a good deal decayed, and the instrument was unsecured upon it. I readjusted it and again made it fast in its new position.

Bournemouth.—The adjustment of the sunshine recorder here was not good, and was altered; but the instrument is of the "Universal" pattern, which is very liable to get out of order through the lens slipping. Owing to trees the position of the instrument is very unsatisfactory, but Mr. Primavesi hopes soon to get a better site for it. I found that hitherto the traces have not been properly measured.

Jersey (Fort Regent).—A railing has recently been placed around the recorder to prevent the cards being interfered with. The post on which it stands had moved a little owing to the removal of some earth close by; it has now been wedged up into its proper position.

Margate.—The sunshine recorder here was badly out of adjustment, and much trouble was experienced in setting the lens, and in getting the instrument in proper position; this was partly due to the frame having become loose and partly to the noon mark being out of the meridian of the instrument. When it was finally set I was unable to fix it permanently, and had to leave this for the observer, who was unfortunately absent from home.

CORRECTIONS FOR BAROMETERS.

STATION.	Standard corrected for Instrumental Error.	Reporting Barometer uncorrected.	Check Barometer uncorrected.	Difference Standard—Reporting.
North Foreland	30·384	30·380	30·370	+ ·004
Dungeness	·334	·310	·308	+ ·024
Hurst Castle	·168	·150	·150	+ ·018
Jersey	30·418	30·412	30·402	+ ·006
Prawle Point	29·894	29·875	29·880	+ ·019
Bramley	·880	·870	—	+ ·010
Cooper's Hill	29·635	29·634	—	+ ·001
Eastbourne	30·167	30·168	—	- ·001
Epsom	29·375	29·350	—	+ ·025
Parkstone	30·041	30·044	30·044	- ·003
Plymouth	30·168	30·166	—	+ ·002
St. Leonards	30·028	30·024	—	+ ·004
Southampton	30·118	30·104	—	+ ·014

Corrections for Thermometers.

Station.	Standard (corrected).	Dry.	Wet.	Spare Therm.	Maximum.	Minimum.	Grass Minimum.
	°	°	°	°	°	°	°
North Foreland	61·4	62·3	61·8	62·0	62·2	62·2	—
Dungeness	59·4	59·8	59·7	—	59·9	59·6	—
Hurst Castle	61·6	62·4	61·8	—	62·0	62·0	—
St. Aubins, Jersey	66·4	67·3	67·5	66·5	67·1	66·5	—
Prawle Point	61·1	61·5	61·2	61·8	61·2	61·3	—
Bramley	70·1	70·0	70·0	—	70·0	69·0	—
Cooper's Hill	54·4	55·0	55·0	—	55·0	54·4	54·6
Eastbourne	65·4	65·6	65·6	—	65·6	65·5	—
Epsom	55·3	55·8	55·6	—	55·2	55·5	52·1*
Parkstone	65·1	—	—	—	65·9†	—	64·8
					65·0		
Plymouth	56·1	56·5	56·2	—	56·9	55·5	56·0
St. Leonards—							
Gensing Gardens	66·4	67·0	67·1	—	66·6	66·4	66·3
West Marina	69·9	70·0	70·0	—	70·0	69·8	—
Southampton	64·1	64·5	64·4	—	65·4	64·2	63·9

* This reading is correct; a small quantity of spirit at top of tube had previously been dislodged by warming.

† This thermometer has now been discarded for the one whose reading is given below.

Report by Mr. J. A. Curtis.

Telegraphic Reporting Stations.

Cambridge, September 17th.—The station was in good order, and the observer seems both competent and careful. The wind-vane appeared to work stiffly, but I oiled it well, and left it working freely.

Loughborough, September 30th.—There was a considerable deposit of lime on the wet-bulb. With this exception, everything was in excellent order.

Stations of the Second Order.

Belvoir Castle, September 21st.—I found everything in good order at this station. A "Stevenson" screen, as recommended last year, has now been supplied. It stands at present over bare earth, but it was promised that turf should be laid down at once. As requested, I paid particular attention to the barometer comparison. The correction of the observer's instrument as determined by me was — ·001. That at present in use is — ·003.

Crawley Farm, Ridgmount, September 15th.—This is a new station, established by the Royal Agricultural Society in connection with their new experimental laboratory. The outfit of instruments is very good and they are excellently exposed. The observer, Mr. H. H. Mann, B.Sc., F.I.C., has taken up the work with great enthusiasm, and from the returns already received I anticipate a valuable series of observations from this station.

Edgbaston, September 24th.—Everything was in excellent order at this station. The self-recording "Osler" rain-gauge has now been completed and is at work. The wind, pressure, rainfall and sunshine are now automatically registered at this station. The sunshine is however, at present recorded by a "Jordan" instrument.

Fulbeck, September 19th.—The work at this station has greatly improved, although it is not yet quite up to standard in every detail. The instruments were clean, and the observations are, I think, taken with care, the thermometer screen has been shifted as recommended on last inspection. The new position is decidedly better. The observer, Rev. Vere F. Willson, M.A., has arranged to place a new rain-gauge on Lincoln Heath. This should yield very interesting results.

Hollesley Bay, September 16th.—This station is very well equipped and the exposure of the outdoor instruments is perfect. The returns are, however, not quite complete—*e.g.*, there are no observations of cloud, either of form or direction, or of weather "since last observation." I spoke of this, and there will be, I hope, some improvement in the future.

Tealby, September 20th.—I found all in good order at this station, except that the wet-bulb was furred. The observer takes great interest in the work and reads the instruments very carefully. As requested, I made special enquiry as to the hygrometric observations, and as the result of a long conversation with the observer I incline to the opinion that this station is exceptionally damp.

Sunshine Stations.

Cambridge, September 17th.—The instrument was clean and in good order, and although the ball is not quite concentric with the bowl, the error is small and not enough to make it worth while to dismount the instrument, which is now firmly cemented in its place.

Harpenden, September 14th.—Recorder clean and in good order in every way.

Hollesley Bay, September 16th.—The recorder has been removed 150 yards to the south-west of its former position. It is now fixed on the top of a specially built brick pillar 10 feet high, to the top of which it is firmly cemented. The adjustment was very good, and the exposure of the instrument is practically perfect. The ball was quite clean and the card properly set.

Weekly Weather Report Stations.

Harpenden, September 14th.—Instruments clean and in good order, and observations carefully taken.

Duddington, September 22nd.—Mr. Coventry was unfortunately absent from home on the day of my visit, but he had arranged for every assistance to be given me. The instruments have been removed

from Ketton Hall to Duddington since the last inspection. They are now fairly well exposed. They were clean and in good order, and, I think, carefully observed.

Stations of the Third Order.

Colley Weston, September 22nd.—This is a rainfall station only. On the last inspection it was recommended that the gauge should be moved. This has now been done, and the present position is satisfactory. The gauge was properly fixed and the register appears to be carefully kept.

Duddington, September 22nd.—A complete monthly summary is received from this station, but the barometer readings cannot be accepted as accurate, the instruments being unverified, and with only a sliding vernier. The thermometers are good and properly exposed, but the wet-bulb read too low. The work appears to be very carefully done.

Harpenden, September 14th.—I found that the 9 p.m. observations at this station have been discontinued, thus reducing the station to one of the third order. This is greatly to be regretted. The instruments were clean and in good order, but the thermometer screen, which is of the "Glaisher" pattern, is too crowded.

Market Rasen, September 20th.—The rain-gauge was not firm, but I wedged it up tight, and left it secure.

Rugby, September 23rd.—A lattice screen has been placed to protect the barometer from the morning sun. This is a great improvement, and seems to have the desired effect. The wet-bulb thermometer was dirty and a good deal furred. I impressed on the observer the importance of using only rain-water to moisten the bulb in future.

I append the usual tables showing the results of the comparison of the instruments at the various stations:—

Corrections for Barometers.

Stations.	Inspector's Standard corrected.	Reporting Barometer uncorrected.	Check Barometer uncorrected.	Remarks.
	Telegraphic Reporting Stations.			
Cambridge	29·969	29·970	—	
Loughborough	29·809	29·814	—	
	Second Order, and Weekly Weather Report Stations.			
Belvoir Castle	29·813	29·812	—	
Crawley Farm	30·190	30·185	—	
Duddington	30·079	30·130	—	
Edgbaston	29·620	29·632	—	
Fulbeck	29·957	29·954	—	
Harpenden	29·963	29·930	—	
Hollesley Bay	30·246	30·250	—	
Tealby	29·813	29·810	—	
Rugby	29·913	29·902	—	

Corrections for Thermometers.

Stations.	Inspector's Standard corrected. (No. 3870.)	Correction to be applied to the readings of						Remarks.
		Dry Bulb.	Wet Bulb.	Maxi-mum.	Mini-mum.	Grass.	Spare.	
		Telegraphic Reporting Stations.						
Cambridge	66·4	−0·6	−0·6	−1·4	+0·6	—	—	
Loughborough ..	56·9	−0·3	−0·3	−0·9	−0·3	0·0	—	Spare min +0·3.
		Second Order, and Weekly Weather Report Stations.						
Belvoir Castle ..	62·5	−0·6	−1·0	−0·6	−0·6	−0·1	—	Spare min. −0·6.
Crawley Farm ..	—	—	—	—	—	—	—	New insts
Duddington ..	54·8	−0·2	+0·6	−0·4	−0·1	—	—	
Edgbaston	60·2	−1·0	−1·0	−0·2	−0·4	0·0	—	
Fulbeck	62·3	−0·8	−0·6	−0·7	−0·6	—	—	
Harpenden ..	66·2	0·0	−0·1	−0·9	+0·3	+1·7	-	Spare grass min. +1·4
Hollesley Bay ..	67·9	−0·6	−0·4	−0·1	+0·1	0·0	-	
Tealby	57·4	−0·7	−0·6	−1·6	−0·3	—	−0·8	
Rugby	56·6	−0·3	−0·4	−0·3	−0·3	+0·2	—	

Report by Mr. F. J. Brodie.

Stations of the Second Order.

Manchester (*Oldham Road*).—September 13th.—The instruments here were all in good order, the sunshine recorder having been carefully adjusted since the inspection of last year. The wind-vane is still badly exposed.

St. Helens, September 14th.—The condition of things here was, upon the whole, very satisfactory. The terrestrial radiation thermometer read a degree too low, but there were no signs of any evaporated spirit in the tube. The authorities are thinking of purchasing a Dines anemometer, and I suggested a good site for this on the tower of the disused dwelling-house in the centre of the park. Dr. Harris fears that for the present it will be impossible to supply 9 p.m. observations, as it would involve the payment of an evening observer. He promised, however, to bring the matter before the notice of the Health Committee.

Darwen (Gillibrand Meteorological Observatory), September 15th.—This is quite a new station. The Observatory is a small wooden erection of octagonal form in the public park, the latter situated on the slope of a rather steep hill leading from the town to the summit of the Darwen moor. The station, though unfavourable for wind observation, is exceptionally well equipped, possessing, in addition to the ordinary outfit of a second order station, a Richard barograph and thermograph, a Dines anemometer, and a self-registering rain-gauge. The instruments are all of the best description and are admirably exposed. A comparison of the barometer (a Fortin standard) with my own showed, however, a large error (about —0·07 inch), and it was therefore suggested that the instrument should be sent back to Kew for re-examination. Mr. Mainland, the observer, is the curator of the Observatory. He seems to take much interest, not only in the work, but in meteorology generally.

Lytham, September 16th.—This also is a new station, in the care of Dr. Jenkins, medical officer of health. The outdoor instruments are well exposed in a railed inclosure on the sea front, and include a set of thermometers in a Stevenson screen, an earth thermometer at a depth of 1 foot, a rain-gauge and a Campbell-Stokes sunshine recorder. The sunshine recorder is placed on a stone pedestal, but at the time of my visit was not properly adjusted. This was carefully done, and the instrument was then firmly cemented on to the pedestal. The only barometer at this station is a Fishery barometer, supplied many years ago by the National Lifeboat Institution, and publicly exposed near the entrance to the pier. The importance of procuring a more accurate instrument was urged very strongly upon the observer. He promised to bring the matter before the Town Council, but did not seem very sanguine as to the result.

Heysham Hall, September 17th.—The thermometer screen in use here is not of the recognised Stevenson pattern, and the temperatures recorded must, I should think, be somewhat too high. The thread of mercury in the dry-bulb thermometer had become detached, and after repeated efforts I failed to get it to re-unite; observer will in future use spare thermometer No. 4849 as a dry bulb. In the maximum thermometer the mercury was divided into three portions, and for some time past the readings from this instrument must have been from one and a half to two degrees too high. In this case the defect was easily remedied. The height of the barometer above M.S.L. is still somewhat doubtful, the nearest bench mark being too far away for the level to be accurately determined without proper instruments. Observer promised to get the true height from the local surveyor and to communicate it at once.

Gilcrux, September 20th.—The instruments were all in excellent order, but I have learnt lately that the station has been abandoned owing to the illness of the observer.

Telegraphic Reporting Station.

Hawes Junction, September 21st.—The observer, Mr. Bunce, was away on annual leave, the observations being taken in his absence by his daughter, whom I was unable to see. The instruments were in good order, and an examination of the observation book seemed to show that the deputy observer was fully equal to the work.

Corrections for Barometers.

Stations.	Inspector's Standard corrected. (M.O. 451.)	Reporting Barometer uncorrected.	Check Barometer uncorrected.	Reporting Barometer. Correction required to reduce to Inspector's Standard.	Remarks.
	ins.	ins.	ins.	ins.	
Manchester .. (Oldham Rd.)	29·900	29·892	—	+·008	
St. Helens ..	30·138	30·132		+·006	Another set of readings taken two hours later gave practically the same result.
Darwen	29·685	29·620	—	+·065	
Lytham	—	—	—	—	This is only a Fishery barometer in wooden frame.
Heysham Hall	29·831	29·820	—	+·011	
Gilcrux	29·722	29·722	29·720	·000	
Hawes Junction	28·885	28·875	—	+·010	

Corrections for Thermometers.

Stations.	Standard corrected. No. 3805.	Dry Bulb.	Wet Bulb.	Max.	Min.	Grass Min.	Remarks.
	°	°	°	°	°	°	
Manchester .. .. (Oldham Road.)	64·8	−0·2	−0·2	0·0	0·0	−0·3	
St. Helens	64·4	+0·3	+0·3	+0·1	+0·3	+1·4	
Darwen	57·8	+0·3	+0·3	+0·1	+0·3	−0·2	
Lytham	65·4	+0·4	+0·4	−0·1	+0·9	—	
Heysham Hall ..	66·4	+0·2	+0·2	0·0	+0·4	+0·2	
Gilcrux	59·4	+0·2	+0·3	+0·2	+0·3	+0·4	
Hawes Junction ..	55·5	−0·3	−0·5	+0·3	+0·5	—	

Inspection of the Observatories and Anemometers, &c.

Report by Mr. T. W. Baker.

Stonyhurst, September 20-21.—All the instruments at this observatory were found in good condition and working satisfactorily.

Since the last inspection the observatory roof has been re-covered with sheet lead, and Father Sidgreaves has had a lead covering fitted

to the iron box containing the reducing gear of the anemometer, which forms a further protection in keeping the apparatus dry.

The cups and pointer have been re-gilded and holes have been tapped and fitted with screws for the purpose of oiling the worm of the direction vane, &c.

In March last one of the cup stays was broken, but this has been satisfactorily repaired, and the instrument is now sound and in good order. The orientation was duly examined and found correct. As regards the rain-gauge, this instrument was going well, and "squeezes" of both the self-recording and spare funnels were taken and are sent in with this report.

The barograph and thermograph were cleaned generally and some stray light was blocked out of both dry and wet recording thermometers by means of lamp-black, after which the zero lines of the thermograph were changed to the winter position.

Glasgow, September 23-24.—The weather being favourable at the time of my visit, I was enabled to entirely take down the external portions of the anemometer and thoroughly clean all parts. The oil in the direction well was in very fair condition, though there was a slight sediment at the bottom. This was removed and fresh asbestos lubricant applied to all bearings, no sperm oil having been sent down from the Meteorological Office.

Since the last inspection a new worm spindle and bearings have been fitted to the direction fans, which appear quite satisfactory.

The clock and recording parts of the instrument were oiled and the orientation was tested and found correct. The usual cleaning of the lenses of both barograph and thermograph was duly performed and the intensity of the light as shown by the photographic traces was much improved.

The rain-gauge clock was taken to pieces and cleaned, and a new line attached to the weight, after which "squeezes" were taken of both the self-recording and spare funnels.

Prof. Becker stated that he has succeeded in adjusting the sunshine recorder by the sun. It was impossible to do so accurately by levelling the frame carrying the cards, as this was found to be not true.

Fort William, September 27-28.—Here I found the various instruments working well. The barograph was dismounted, the clock taken to pieces and cleaned, and a new line attached to the weight. Also the thermograph clock was cleaned, and an additional weight added to the lever of light stop in order to improve its action.

Mr. Rankin reported that the thermograph screen had been painted in the spring. The rain-gauge was in excellent order, but I cleaned the clock and put in a new line for the weight, after which "squeezes" were taken of both funnels. As regards the sunshine recorder, the weather was too cloudy at the time of my visit to see to the adjustment, but Mr. Rankin stated that he had been endeavouring to adjust the instrument by the sun, as he found that when levelling by the cusps of metal bowl, the trace marked did not run parallel with the centre line of card.

Deerness (*Orkney*), October, 1-3.—The glass case sent out from the Office in March last, to cover the recording apparatus and clock, I found to fit very well, with the exception of the side door, which could not be closed tightly owing to the framework touching the clamping screw of clock. Mr. Spence was of opinion that the stoppage of the clock on one or two occasions was due to this. I had the cover taken off and cut away the framework, so that the door can now be safely closed without any fear of touching the clamping screw. Whilst seeing to this I noticed that the clock itself was not firmly screwed down to the slate slab, and in consequence the gearing of the driving wheel of the clock and cylinder would vary from time to time, so that it is just possible that this would account for the peculiarity frequently shown in the velocity trace at starting.

I entirely dismounted the exterior portion of the anemometer, and found that the oil in the direction well had become very thick and dirty; this was removed, and all bearings thoroughly cleaned and replenished with the sperm oil recently sent out by the Office.

The endless screw of the direction spindle has become very much worn, as well as the *lignum vitæ* bearings for the fans, and new ones are required at the earliest opportunity.

I took the clock to pieces and cleaned it, and attached a new line to the weight. The orientation was duly examined and the sheet marked.

Aberdeen, October 5-7.—As usual at this observatory, all the instruments were found in excellent order.

The barograph and thermograph clocks were taken to pieces and cleaned, but not those of the anemograph or rain-gauge, which did not require it.

The external parts of the anemometer were dismounted, and the oil in the direction well was found quite good, but I had it removed and fresh local sperm oil added to all the bearings, after which the orientation was tested and found correct.

The repairs suggested by the Inspector last year have been satisfactorily carried out by Mr. Munro.

In December last Mr. Boswell shifted the self-recording and spare rain-gauges from the old site to the grounds immediately adjoining the College. I found that both instruments had been carefully fitted up, and the exposure is quite open on three sides, the nearest building being about 100 feet distant to the south, and from 25 to 30 feet in height. Rubbings of both funnels were taken and the papers are sent in with this report. The Stevenson screen has been painted in accordance with Dr. Buchan's instructions to Mr. Boswell.

Alnwick Castle, October 10.—At the date of my visit Mr. Willyams was absent, but he had very kindly left instructions for his assistant to help in examining the anemometer. I found that the exterior portions were all well oiled, and the instrument is carefully attended to by the resident mechanic, under the supervision of Mr. Revall, the

architect. The registering apparatus is in excellent order, the clock having been cleaned just prior to my arrival by a local watch-maker. I oiled the clutches of both the direction and velocity pencils, as well as the escapement of clock. The orientation was examined and found satisfactory. The assistant reported that the last tracing sheets received from the Office were a little smaller in scale than the printed sheets, which would account for the extra overlapping at the top and bottom of the tracing sheets.

North Shields, October 11th-12th.—The anemometer here was working very well indeed, and is in excellent order. With the assistance of the mechanic who attends to the periodical oiling of the instrument, under the direction of Captain Harrison, we entirely dismounted the instrument, and found that the oil in the direction well was in such excellent condition that I did not think it necessary to remove it. The other parts, however, were cleaned and lubricated with fresh sperm oil. The clock was taken to pieces and cleaned and the recording apparatus received due attention, after which the orientation was examined and found correct.

Yarmouth, October 14th-15th.—At the date of my visit to this station the weather was unfortunately rough and stormy, and in consequence it was not easy to dismount the anemometer entirely. I found, however, that the instrument was in good order, well oiled and carefully kept. The registering apparatus I cleaned and oiled, and carefully examined the velocity pencil to try and discover the cause of the "kink" which is shown in the trace between the 40 and 50 mile space. The spiral pencil did not appear to be indented, but I lightly rubbed it with a fine emery buff and am in hopes that this may improve the traces. There is considerable play in the gearing of the velocity pencil owing to the length of shafting, which will account for the uneven marking of the trace at times.

The orientation was examined and the sheet containing the result is forwarded with this report.

Telegraphic Reporting and Climatological Stations.

Stonyhurst, September 21st.—Here all the instruments were in good order.

Alnwick Castle, October 10th.—At this station the rain-gauge (5 inch) is almost worn out and a new one is much needed. The thermometers were found in good order, excepting that the muslin covering to the wet bulb was rather soiled; this I had changed.

North Shields, October 12th.—Since the last inspection Mr. Irvine has left, and the station is now under the charge of Mr. Clarke. I found all the thermometers in excellent order, but a new rain-gauge is wanted, the present one being old and much worn. Mr. Clarke and I agreed very well in reading off the barometer and thermometers.

Yarmouth, October 15th.—The various thermometers and rain-gauge were all found in excellent order.

CORRECTIONS FOR THERMOMETERS.

Station.	Temperature of water. Ther. No. 721.	Dry Bulb Stand.	Wet Bulb Stand.	Maximum Thermometer.	Minimum Thermometer.	Additional Thermometers.	
						Description.	Correction.
	°	°	°	°	°		°
Aberdeen ..	50	*−0·1	*−0·6	+0·1	+0·4	Barograph thermometer	−2·2
						Standard bar. attd. ther.	−0·4
Alnwick	53	−0·2	−0·4	−0·1	+0·3	.. ..	—
Fort William ..	55	* 0·0	*−0·2	+0·1	+0·6	Barograph thermometer	−2·1
						Standard bar. attd. ther.	−0·3
Glasgow	56	*−0·1	*−0·1	0·0	0·0	Barograph thermometer	−0·8
						Grass minimum ther. ..	0·0
North Shields ..	54·1	−0·1	−0·3	−0·2	+0·6	.. ..	—
Stonyhurst ..	55	*−0·1	*−0·4	−0·1	+0·4	Barograph thermometer	−0·6
						Standard bar. attd. ther.	−0·8
Yarmouth ..	54·6	−0·1	−0·2	−0·5	+0·5	.. ..	—

* These instruments are in the Thermograph screens.

REPORT BY MR. E. G. CONSTABLE.

Holyhead, July 21st-23rd.—The four anemometers at this station were inspected, and, speaking generally, were in good condition and evidently well looked after.

The "Robinson" was dismounted and overhauled. I found that the upper part of the cups spindle had worked loose, and there was decided "play." This was put right, and two of the direction fan blades which had broken away were repaired. The sperm oil was in very good condition, it was replaced with fresh sperm oil supplied from the Office.

On examining the recording part I noticed that the upright dwarf spindle supporting the direction mitre wheel and tube was loose, this was screwed home. Endeavours were made to reduce the "play" noticed in the traces, but there is not space enough to alter the lugs sufficiently, but it was improved somewhat by reducing the thickness of the frame, and gearing in the cylinder driving wheel a little closer.

The orientation was good, and the check lines will be found on the curves Nos. 202 and 203.

The "Dines" anemometer was apparently working satisfactorily. The casing and float were carefully removed and the interior examined.

The water was clear, and the white deposit (noted in my 1896 report), although present, was by no means so considerable, but the soldered joint of the cover is giving out at the bottom.

Everything was thoroughly cleaned. By the help of ladders and assistance I was able to have the vane removed. The inner surface of the tube had a thin wet deposit. Both the tube and the spindle of the vane were dried and cleaned and left in better condition. The cylinder clock belonging to this instrument I had cleaned locally, as it had not been done for some time, and the balance spring needed a little regulating.

The "Bridled" anemometer appeared to be in good order. The oil in the bearings, both inside and outside, was decidedly thinner and better than it was at the time of my last visit. All parts were cleaned and freshly lubricated, but the clock had only recently been cleaned, and so did not require much attention.

Mr. Davis seems very satisfied with the working of the tracing-wheel pen now used with this instrument.

The "Pressure-plate" anemometer was also examined. The "plate" seemed to run rather jerkily, so the chain was removed and the pulleys cleaned. There was a considerable deposit—apparently of iron rust—on the ratchet and toothed scale. This was removed, and the moving parts lubricated.

The hut and anemometers on Salt Island are now enclosed with a 6-foot stone wall, which is a decided improvement, and should help to protect the instruments from wilful damage.

Fleetwood, July 25th-26th.—The weather during my visit here was dry and calm, and I was thus enabled to have the anemometer dismounted both inside and outside the building.

The lubricant (sperm oil) was fluid, but very discoloured.

Here, as at Holyhead, the upper part of the velocity spindle, taking cups and oil well, was loose. I fitted a new pin and tightened up the joint.

Some blades of the direction fans were loose; these were soldered down.

The orientation was tested, both before and after disturbing instrument, and was satisfactory in both cases, and the markings will be found on the Fleetwood curves, Nos. 206 and 207.

The "back-leash" with the worm on the direction fan-spindle is rather marked, and tends to slow down the vane.

The driving line of the clock was wearing out; I fitted a new and stouter cord, cleaned the escapement, and altered the bob a shade, the clock showing a tendency to gain.

The outside portion of the instrument needs a coat of paint, and Mr. Gaulter promised to have that done if possible during the autumn.

Armagh, July 27th-28th.—Dr. Dreyer was absent at the time of my visit, but all necessary assistance was given me.

The anemometer was in good order, and the asbestos lubricant was in most excellent condition, and could probably have gone for another year; it was removed, and replaced with fresh oil. After the experience at Holyhead and Fleetwood with the velocity cups shaft, I gave additional attention to that shaft here, but there was no indication whatever of any dislocation.

The pin from one end of the direction fan spindle was missing; this was supplied. The clock, &c., was cleaned and the orientation tested, and the sheet is attached to this report.

The trees from about S.W. to N.W. considerably shelter the anemometer, but I was given to understand that they would be "polled" during the early winter.

Examination of the Beckley rain-gauge shewed that the clock would be improved by cleaning, &c. This was done, and the bob of pendulum raised, to allow for the lengthening of the "Willesden" sheets. The attention of the observer was drawn to the necessity of making a datum line daily when starting each curve.

The hawthorn hedge to the N. has been cut much lower, which is certainly an advantage as to the exposure of the gauge.

Dublin (*Phœnix Park*), July 29th-30th.—The anemometer at this station appeared to be working satisfactorily, but examination shewed that it required attention, especially the clock, so all parts were taken down.

The lubricant for the vane head was clean and fluid, and the ball bearings bright. The oil in the brake-box was fluid, but of a dark green colour; this was removed, and box refilled with fresh sperm oil.

The clock was dismounted and thoroughly cleaned, and all left in good order.

The orientation was satisfactory, and the sheet is sent herewith.

The silver helices appear to be a decided improvement upon the old pencils.

The exterior column, brake-box, and clock case require painting, and Col. Hellard agreed to have this done.

Dublin time is kept at this station.

Valencia, August 2nd-4th.—The self-recording instruments at this Observatory evidently continue to receive regular and careful attention.

The thermograph was in good order and the light-shutter working well; the clock, lenses, &c., were cleaned.

The light-shutter of the barograph has been uncertain and irregular in its action for some time, despite Mr. Cullum's endeavours to improve it.

Inspection of the shutter work failed to reveal anything radically wrong with it, but finally I increased the weight on the locking-arm and altered the leverage of the lifter, and had part of the casing chiselled out, as there was a suspicion that the weight grazed against the side.

The shutter was working properly when I left and the action will now, I believe, be more certain, but should the improvement not prove permanent I would suggest that Mr. Cullum be asked to try the effect of closing in the screw holes in the back plate, as the threads are rather worn and this may cause the arm to cant over during the drop.

Examination was made of the barometer tube, diaphragm and lenses, but no definite cause could be found for the penumbra which occurs on the photographic sheets when the column falls below 29·3 inches. Endeavours were made by altering the tube, and by trials of the lamp and condenser at various heights, &c., to remedy the defect, but of course the result cannot be ascertained until after the barometer has fallen to this low point.

The "temperature-bar" was taken out and cleaned, as the knife edges were becoming rather dirty.

The anemometer was dismounted. The asbestos lubricant although dirty was fluid, and considering that it had been in use for two years its condition was certainly satisfactory. It was removed, and fresh asbestos lubricant put in.

Three of the direction-fan blades had broken away from the wire stays; these were soldered down. The cups and their upper cross stays are shewing evident signs of "wearing."

The recording part was in good order, but the chain from barrel to fusee of the clock had broken at times, causing several links to be lost,

and so had become rather too short, so I got the local watchmaker to fit another fusee chain, and the clock is now in good condition again.

The rain-gauge clock also required cleaning, which was done, and as some difficulty is always experienced in attending to this particular clock owing to the cover not being bevelled off to clear the levelling screws, I had two semi-circular pieces cut out of the base, which will avoid in future dislocating the entire instrument whenever the clock or pendulum demands attention.

Falmouth, August 8th-10th.—The self-recording instruments here were in their usual satisfactory condition.

There was nothing in the barograph or thermograph calling for special notice; they received the customary cleaning.

The boarding under the thermograph clock—probably owing to warping—was dangerously near the end of the rating nut, so I had it channelled out to allow of a safe distance.

The asbestos lubricant in the anemometer was in good condition; it was removed, and the new sperm oil supplied by the Office used. All parts were cleaned and lubricated.

The upper piece of cup spindle had loosened a little. This was put right, and a couple of direction blades which were also loose were repaired.

The worm on the direction-fan-spindle is worn extremely thin, causing considerable side-shake, with a liability to bend up with sudden oscillations in direction. A new worm-spindle would be a decided improvement.

The recording pencils, clock escapement, &c., received the usual attention.

Orientation was checked and found good, and sheet shewing same is sent herewith.

The building operations, to which I drew attention on my last visit here, have been continued, but the ground landlord has agreed with the Observatory Committee not to allow the erection of any more houses in the vicinity, and a piece of ground to the S.E. has been taken on lease, in order to assist in preserving the exposure. The aspect from S.E. to N.N.E. is still clear and unobstructed.

The Beckley rain-gauge was working satisfactorily, but the clock required cleaning. New wooden steadying pegs were fitted to the check-gauge, the old ones being worn out.

St. Mary's, Scilly Isles, August 12th-to-14th.—The Robinson and the Dines anemometers at this station appeared to be working properly. They were both dismounted and examined.

In the Robinson, the oil for the roller bearings of the vane was clean and fluid, but in the brake-box it was very dark, with a slight sediment on the bottom of the case. This was cleared out, fresh sperm oil put in, and the instrument left in good order. I found the floor of the frame, on which the brake-box is fixed, covered with water, and so was also the sunk upper surface of the spur wheel on vane shaft. As the doors of the frame were thoroughly screwed home, puttied up and painted, the rain could not have got through there, and it is very probable that it drives in under the lip at the top of the column supporting vane, which is rather shallow.

The clock and recording apparatus was cleaned, and I left with Mr. Hicks a little Kelly's clock oil, as he appears of late to have been using ordinary sperm oil for the clock, which is not good enough. The orientation was satisfactory, and the sheet is sent herewith.

The "Dines" was in good order. The water proved to be clean, and with but a very slight deposit. The interior, float, &c., were thoroughly cleaned and dried, and fresh water introduced. The clock was removed from the cylinder and oiled.

The vane was dismounted. The inside of the tube was wet, and with a thin deposit, but I could not detect any signs of serious wear or scoring. It was dried and cleaned.

The War Department are erecting huts and buildings to the S. and S.W. of the anemometers, but they are too distant at present to at all interfere with the exposure of the two instruments.

Radcliffe Observatory, Oxford, September 16th-17th.—The self-recording meteorological instruments at this Observatory were in first-class order. The barograph and thermograph had been recently cleaned, the light-shutters were acting well, and the photographic curves were very good.

Examination of the Robinson anemometer proved it to be well oiled, and the asbestos-lubricant for the direction-roller bearings, was, this year, in a very satisfactory state, clean, and fluid, and did not require removal.

The orientation was tested and found correct.

The Beckley rain-gauge was taken down and found to be in good order, but another Richard pen—unmounted—and a supply of "encre spéciale," is required for this instrument.

Telegraphic and Second-Order Stations.

Holyhead, July 20th.—The meteorological instruments were in good condition, but the supports of the Stevenson screen were becoming rotten, and Mr. Chope was doubtful if they would last another winter.

I therefore had them strongly repaired, and also new hinges fitted to door, and the screen is now in good condition again.

Mr. Chope has hitherto had some difficulty in finding a reliable substitute, but has now made arrangements for the continuity of the observations during any occasional absence.

Armagh, July 28th.—The thermometers and screen were in good order, but the grass minimum might with advantage be removed a little further from the Stevenson screen.

I experienced trouble with the mercurial minimum, owing to the index becoming deranged through the tube slipping in the water used for testing, but I hope it was put in order again before leaving.

Dublin (*Phœnix Park*), July 30th.—The thermometers here were in good order, and the Stevenson screen is now firmly fixed, with four extra struts. The maximum, as fitted up, obstructed a clear view of the dry and wet thermometers, so I altered both the maximum and minimum tubes. Sergeant Blight, who has been the observer for several months, was absent at the Curragh at the time of my visit,

but at Colonel Hellard's request I went again on August 6th, on my return from Valencia, and was then able to take comparative observations of all the instruments with the observer, which proved satisfactory.

St. Mary's, Scilly Isles, August 13th.—The Stevenson screen, thermometers, and barometer, at this telegraphic station were in good order and condition.

The Richard barograph was recording slightly too high. This was corrected to the standard.

Corrections for Thermometers.

Station.	Temperature of water. Ther. No. 720.	Dry Bulb Stand.	Wet Bulb Stand.	Maximum.	Minimum.	Additional thermometers.	
						Description.	Correction.
Armagh	56	−0·3	−0·2	−1·0	+0·1	Grass minimum	+0·6
Dublin .. .. (Phœnix Park).	60	−0·4	−0·5	−0·4	+0·2	„ „	+0·1
Falmouth ..	60	*−0·5	* 0·0	−0·5	+0·2	Barometer thermometer	−0·9
Holyhead ..	63	−0·2	−0·2	−0·3	+0·4	Spare tube	−0·2
Scilly Isles .. (St. Mary's).	62	−0·7	−0·5	−0·5	0·0	„ „	0·0
Valencia	60	*−0·7	*−0·4	0·0	+0·3	Barometer thermometer	0·0
Oxford .. .. (Radcliffe Observatory).	64	*−0·2 −0·3	*−0·2 −0·2	−0·4	+0·1	Grass minimum .. .. Ther. attached to bar. No. 17249. Ther. attached to bar. No. 1708. Dry Bulb Ther. 1710 .. Wet Bulb Ther. 1709 ..	+0·4 −0·8 −0·4 −0·3 −0·2

* These instruments are in the Thermograph screens.

APPENDIX VI.

Method of Dealing with Telegraphic Weather Intelligence.

The operations connected with the preparation and issue of the Forecasts and Storm Warnings have not undergone any material change.

Full details will be found in Appendix X. to the Report for 1891.

Daily Weather Report.

The Office receives, when the telegraphic communications are perfect, sixty reports each morning, eighteen each afternoon (except on Sundays), and twenty-nine each evening, the arrangement of which is explained in the Annual Reports for recent years, but a reduction of the number of stations is in consideration.

The change made in the Daily Weather Report during 1894, by the insertion of Reports from the Azores (forwarded by the courtesy of the Portuguese Meteorological Authorities), is still in force. The Report fills four large quarto pages, as it has for several years past.

The standing portions (maps, &c.) are printed in blue, and the information for each day is in black.

The Monthly "Correction and Addition List" is published as before.

The subscription for the Report is—

For delivery by hand, where feasible, £2 *per annum;*
„ *by book post* £1 „

N.B.—Subscriptions are payable in advance, Annually or Quarterly; those for a Quarter end at the Official Quarter days, *e.g.*, March 31, June 30, &c.

Weekly Weather Report.

The Weekly Weather Report, which has appeared since February 1878, and was re-arranged at the commencement of 1890, is prepared for the calendar week, Sunday to Saturday, and is steadily increasing in value. It is published regularly on Thursdays, and is illustrated by three maps for each day, which, like those in the Daily Reports, show the outline of the land and surface of the sea in blue, while the daily information is in black. The maps show (1) for 8 a.m., the temperature, weather, and sea disturbance; and (2) for 8 a.m. and (3) for 6 p.m., the distribution of pressure, and the winds, over, and on the coasts of, Europe. The information on the first and second pages of each Report consists of observations of Temperature and Rainfall made at 78 stations, the individual values for which are given on the second page of the Report. Sunshine records taken at 60 stations are given on the second and sixth pages of each Report.

Tables of *Accumulated Temperature*, designed to give persons engaged in agriculture better means for estimating the manner in

which vegetation is affected by temperature than that afforded by the more usual methods of treating the readings of the thermometer, are still published on the first and second pages, and show for each week, and for the whole period from the beginning of the year, the weekly and progressive values respectively, of the combined amount and duration of the excess or defect of the air temperature, above or below a suitably fixed standard, or *base temperature*. The base value adopted is 42° Fahr.

Accumulated Temperature is expressed in *Day degrees;* a Day-degree signifying 1° F. of excess or defect of temperature above or below the base (42° F.) continued for 24 hours, or any other number of degrees for an inversely proportional number of hours.

The following are the rules for computing, for a weekly period, from the observed maxima and minima, the accumulated temperature above or below 42° F.:—

1. Obtain the mean temperature, from the means of the seven observed maxima and minima, suitably corrected for non-periodic changes of temperature.

2. In obtaining the accumulated temperature four cases may occur, to which the following rules will apply:—

Conditions of Temperature.	To obtain the daily Accumulated Temperature.	
	Above 42° F.	Below 42° F.
If the minimum is *above* 42° F., or *equal* to 42° F.	Subtract 42° F. from the mean.	There is none.
If the minimum is *below* 42° F., but the mean for the day is *above* 42° F.	From the difference between the mean for the day and the minimum deduct the accumulated temperature below 42° F., calculated as stated in the next column.	The required quantity is the excess of 42° F. over the minimum, multiplied by the coefficient 0·4.
If the mean for the day is *below* 42° F., but the maximum is *above* 42° F.	The required quantity is the excess of the maximum over 42° F., multiplied by the coefficient 0·4.	From the difference between the mean for the day and the minimum deduct the accumulated temperature above 42° F., calculated as stated in the preceding column.
If the maximum is *below* 42° F., or *equal* to 42° F.	There is none.	Subtract the mean from 42° F.

In each of the above cases the result will be the average *daily* value, and must be multiplied by 7 in order to obtain the value for the whole week.

The coefficient varies with the duration of the period, and also with the base temperature.

The co-efficient given above, in Rules 2 and 3, is for a weekly period, and for the base temperature 42° F. The following are its values for other base temperatures,—for 32° F., 0·4; for 52° F., 0·33; for 62° F., 0·25.*

* A full explanation of the principles on which these rules are based will be found in Appendix II. to the Quarterly Weather Report for 1878.

In addition to the reports from the Telegraphic Reporting Stations, and the returns from certain self-recording Observatories, weekly schedules from 56 volunteer observers are used, the names of the stations and observers being given in Appendix XI., p. 89.

An early copy of the MS. of the Report is prepared on Tuesday in every week, and the summary on its first page is sent to several papers on that evening; the printed copies of the complete Report are ready for sale on Thursday afternoon.

Summaries and Appendices to the Weekly Weather Reports.

Two Appendices, I. and II., have appeared, similar to those for several recent years.

The *Monthly Summary Supplement* gives the average values for Pressure, Temperature, Rainfall, and Bright Sunshine of the current month, and the difference between these values and the means for the corresponding months in a long series of years, together with the number of days on which rain, snow, hail, thunder, &c., &c. occurred, and the number of days on which the wind blew from the eight principal points of the compass, and a brief *résumé* of the principal features which have marked the weather of the month. It is illustrated by four maps, showing the distribution of the average pressure and temperature and of the rainfall for the period, and the movements of the principal depressions which have passed over the British Islands and their neighbourhood.

Issue of Forecasts.

Remarks on the actual state of the weather, and Forecasts *for not more than one day in advance*, are prepared at the Meteorological Office as under: —

*On Week Days.**

(1.) At 11 a.m. (from the morning reports), for the 24 hours ending at Noon on the day following the date of issue. These are intended especially for the early editions of the evening papers, for the Clubs, and for exhibition at certain selected places (see note on page 10).

(2.) At 3.30 p.m. (from the morning and afternoon reports), for the day following that of issue. This set of forecasts is supplied to a few newspapers and a copy is exhibited regularly at the door of the Meteorological Office. During the Hay Harvest they are telegraphed to about 28 well-known agriculturists, to be made known in their neighbourhood (see p. 11).

(3.) At 8.30 p.m. (from the 8 a.m., 2 p.m., and 6 p.m. reports), for the civil day following that of issue. These are supplied gratis to any newspaper or news agency which may apply for them, and send for them regularly. A very large number of the more important papers and news agencies avail themselves of this advantage.

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* Good Friday, Christmas Day, and Bank Holidays are reckoned as Sundays.

The forecasts are made for the following districts:—

0. Scotland, North.
1. Scotland, East.
2. England, N.E.
3. England, East.
4. Midland Counties.
5. England, South (and English Channel).
6. Scotland, West (with Isle of Man).
7. England, N.W. (with North Wales).
8. England, S.W. (with South Wales).
9. Ireland, North.
10. Ireland, South.

The remarks and forecasts are posted at the doors of the Meteorological Office, 63, Victoria Street, S.W., on week days,* for the inspection of the public. Copies or extracts from them, are communicated under the conditions stated below, but no information which is not substantially included in them will be supplied.

A series of boards is exhibited on the front of the Office showing in large type the state of the wind, weather, and sea disturbance at six stations, situated on our S.E., S., and W. coasts. The stations selected are Yarmouth, Dungeness, The Needles, Scilly, Holyhead, and Valencia (Ireland), and the observations posted up are those for 8 a.m. and 2 p.m. daily, except on Sundays,* the boards being changed at about 9h. 45m. a.m. and 3h. p.m. The information can be easily read from the street.

Forecasts for Subscribers.—Any person can be supplied with a copy of the Forecasts by post, once on each week day,* on payment of a subscription of ten shillings per annum, or 2*s.* 6*d.* per official quarter, or any part thereof, *in addition to the cost of transmission;* the charges will therefore be, by *letter* post, 9*s.*, by *book* post, 5*s.* 9*d.*, per quarter.

The forecasts for any individual district and for any of the hours mentioned above can be forwarded by telegraph, on payment of 3*d.* per day for any definite period, in addition to the cost of transmission.

Forecasts for Clubs.—These are drawn up at 11 a.m., for all the districts, and are supplied to Clubs, for a subscription of ten shillings per annum. They are delivered by hand to Clubs situated in or near Pall Mall. Special arrangements can be made for delivery at a greater distance by hand or by post.

Forecasts for Hay and Corn Harvests, or for Public Use.—Special facilities are offered for the transmission of Forecasts for these purposes, a nominal fee of 2*s.* 6*d.* being charged for an official quarter or any part thereof, in addition to the cost of the telegrams. These are supplied only to Agriculturists, or to persons making public use of them.

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* Good Friday, Christmas Day, and Bank Holidays are reckoned as Sundays.

Exhibition of Telegraphic Forecasts at Local Post Offices.—The Post Office has sanctioned the exhibition of Forecasts at Local Post Offices, provided space is available, if the persons to whom they are addressed desire them to be so exhibited instead of being delivered to themselves.

Unless otherwise arranged, all forecasts transmitted by post are sent by book post, not as letters.

Inquiries as to the Weather.

Inquiries Personally or by Messenger.—Any person applying at the Meteorological Office between 11 a.m. and 8 p.m. on week days, and between 7 p.m. and 8 p.m. on Sundays,* can be supplied, in writing, with the latest information in the possession of the Office, with regard to the weather in any district, or the latest forecast issued for any specified district, on payment of one shilling for each inquiry.

Inquiries by Letter.—Application may be made by letter, enclosing thirteen pence in stamps if the reply is to be *by post*, and one shilling in stamps, *in addition to the cost of the reply* (consisting of ten words, exclusive of the address) if the reply is to be *by telegraph*.

Inquiries by Telegraph.—Any person may obtain *by telegraph* from the Meteorological Office the latest information as to the weather in, or the latest forecast for any district of, the United Kingdom by payment of a fee of one shilling *in addition to the cost of a telegram and reply to any post office*. The telegram containing the inquiry must be addressed as follows:

To

Weather,

London.

The payment for the reply should be for at least ten words in addition to the address.

Application may also be made for similar information to be sent either *by telegraph* or *post* on any future specified day.

Checking of Forecasts and Storm Warnings.

The forecasts and storm warnings issued by the Office are carefully checked by being compared with the conditions actually experienced during the time to which they refer. The method adopted was fully explained in the Annual Report for 1891, and the results for 1898 will be found on pp. 11-14.

In order to render the information in the possession of the Office as to the weather experienced on our coasts still more complete, the Council have, as in preceding years, obtained from the various Light-house Boards the original log-books from some of the most exposed lightships and lighthouses. They again express their cordial thanks for the co-operation so readily granted to them by these Boards.

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* Good Friday, Christmas Day, and Bank Holidays are reckoned as Sundays.

APPENDIX VII.

Report on the Comparison of the Forecasts issued at 8h. 30m. p.m. with the Weather subsequently experienced, for the 12 Months April 1898 to March 1899. The results are for the United Kingdom as a whole.

The letters used have the following signification:—

a=complete success.	**c**=partial failure.
b=partial (more than half) success.	**d**=total failure.

The checking has been conducted on the same system as that employed in previous years, *i.e.*, each forecast has been considered under the separate headings of "Wind" and "Weather," but the results of the 8.30 p.m. Forecasts only are here published.

The first column gives the percentage of success in "Wind," the second in "Weather," and the third the average of the other two.

The Summary for the various districts is given at page 11.

Months.		Percentages. Wind.	Weather.	Average.	a + b.
April	a	43	58	51	83
	b	33	31	32	
	c	20	9	14	
	d	4	2	3	
May	a	53	61	57	85
	b	28	27	28	
	c	15	8	11	
	d	4	4	4	
June	a	59	59	59	85
	b	26	25	26	
	c	11	11	11	
	d	4	5	4	
July	a	59	59	59	82
	b	24	21	23	
	c	13	14	13	
	d	4	6	5	
August	a	41	45	43	79
	b	38	34	36	
	c	16	17	17	
	d	5	4	4	
September	a	51	65	58	86
	b	33	22	28	
	c	12	8	10	
	d	4	5	4	
October	a	50	66	58	84
	b	28	23	26	
	c	16	9	12	
	d	6	2	4	
November	a	46	58	52	84
	b	32	31	32	
	c	18	3	10	
	d	4	8	6	
December	a	43	60	52	86
	b	39	30	34	
	c	16	8	12	
	d	2	2	2	
January	a	45	57	51	81
	b	30	29	30	
	c	18	11	14	
	d	7	3	5	
February	a	56	57	57	79
	b	20	25	22	
	c	18	13	16	
	d	6	5	5	
March	a	52	66	59	82
	b	25	20	23	
	c	18	10	14	
	d	5	4	4	
The entire year	a	50	59	55	83
	b	30	27	28	
	c	16	10	13	
	d	4	4	4	

APPENDIX VIII.

Storm Warnings.

The Meteorological Office issues notices of atmospherical disturbances on or near the coasts of the British Islands (free of charge) to ports and fishing stations recommended by responsible local authorities.

The fact that one of these notices has been received at any station is made known by hoisting a black canvas cone, 3 feet high and 3 feet wide at base, which has the appearance of a triangle when hoisted. The telegram directing the cone to be hoisted should be exhibited near the signal staff.

At dusk, whenever a signal ought to be flying if it were daylight, a night signal, consisting of three lanterns hung on a triangular frame, may be hoisted in place of the cone.

The Meteorological Office supplies the canvas cone, but does not undertake to supply the lanterns. In all cases the local authorities must undertake the charges incidental to the hoisting of the signal, such as flagstaff and gear, oil, &c., and also as to the keeping of the apparatus in repair, painting, &c.

The following is a list of the stations to which storm-warning telegrams are sent:—

NORTHERN.	WESTERN.	SOUTHERN.	EASTERN.
Scotland, N.E.	Ireland, S.W.	England, S.W.	England, N.E.
Lerwick.	Tuskar L.H.	The Lizard.	Berwick-on-Tweed.
Scalloway.	New Ross.	Falmouth.	Cullercoats.
Dunrossness.	Dunmore East.	Pendennis.	Tynemouth.
Sumburgh Hd. L.H.	Dungarvan.	Mevagissey.	South Shields.
Noup Head L.H.	Minehead L.H.	Mount Batten.	Souter Point L.H.
Stromness.	Youghal.	Plymouth.	Sunderland.
Kirkwall.	Queenstown.	Devonport.	Hartlepool.
Cantick Head L.H.	Cork.	Prawle Point.	Middlesborough.
Holborn Head.	Passage.	Teignmouth.	Redcar.
Dunnet Head.	Kinsale.	Exmouth.	Flamborough Hd
Wick.	Do. (Old Head).		Whitby.
Tarbet Ness L.H.	Galley Head L.H.		Filey.
Avoch.	Castletownshend.		Bridlington.
Inverness.	Fastnet Rock L.H.		Hull.
Nairn.	Brow Head.		Goole.
Burghead.	Tralee.		Grimsby.
Lossiemouth.	Limerick.		Boston.
Buckie.	Loophead L.H.		
Port Knockie.	Galway.		
Cullen.			
Portsoy.	Ireland, N.W.		
Banff.			
Fraserburgh.	Killybegs L.H.		
Peterhead.	Tory Island L.H.		
Aberdeen.	Lough Swilly L.H.		
Girdleness L.H.	Rathmullan.		
	Malin Head.		
	Portrush.		
	Port Ballintrae.		

[*Continued.*

NORTHERN.	WESTERN.	SOUTHERN.	EASTERN.
SCOTLAND, E.	IRISH SEA.	ENGLAND, S.	ENGLAND, E.
Stonehaven.	Belfast.	Guernsey.	Sutton Bridge.
Montrose.	Donaghadee.	St. Helier's (Jersey).	Lynn.
Scurdy Ness L.H.	Burr Point.	Gorey „	Sheringham.
Broughty Ferry.	Howth.	Weymouth.	Cromer.
Dundee.	Kingstown.	Anvil Point L.H.	Great Yarmouth.
St. Andrews.	Pt. of Ayre (I. of M.)	Poole.	Southwold.
Anstruther.	Ramsey „	Southampton.	Orford Ness L.H.
Pittenweem.	Douglas „	Hamble.	Ipswich.
Buckhaven.	Castletown „	Yarmouth.	Harwich.
Methil.	Silloth.	Cowes.	Gunfleet L.H.
Wemyss, West.	Maryport.	Ryde.	
Burntisland.	Workington.	St. Catherine's Pt.	
Grangemouth.	Whitehaven.	Portsmouth.	
Bo'ness.	Barrow.	Littlehampton.	
Granton.	Walney Is. L.H.	Brighton.	
Newhaven.	Morecambe.	Newhaven.	
Leith.	Fleetwood.		
Fisherrow.	Blackpool.		
Dunbar.	Lytham.		
Cockburnspath.	Southport.		
St. Abb's Head.	Formby.		
Eyemouth.	Liverpool.		
	Runcorn.		
	Hoylake.	ENGLAND, S.E.	
	New Brighton.		
	Connah's Quay.	Eastbourne.	
SCOTLAND, N.W.	Penmaenmawr.	Hastings.	
	Port Penrhyn.	Rye.	
Fair Isle L.H.	Point Lynas L.H.	Sandgate.	
C. Wrath L.H.	Skerries L.H.	Folkestone.	
Stourhead L.H.	Holyhead.	Dover.	
Port of Ness.	South Stack L.H.	Deal.	
Stornoway.	Caernarvon.	Ramsgate.	
Island Glass L.H.	Port Dinorwic.	Margate.	
Portnaguiran.		Faversham.	
	ST. GEORGE'S CHANNEL.	Sheerness.	
		Chatham.	
	Aberystwyth.	Greenhithe.	
	Milford.		
SCOTLAND, W.	BRISTOL CHANNEL.		
	Small's L.H.		
Glasgow.	Caldy L.H.		
Greenock.	Pembrey.		
Rothesay.	Llanelly.		
Lamlash.	Swansea.		
Carradale.	Briton Ferry.		
Campbelton.	Porthcawl.		
Rhuvaal L.H.	Nash L.H.		
Mull of Cantire L.H.	Penarth.		
Rhinns of Islay L.H.	Cardiff (Bute Dock).		
Ardrossan.	Do. (Barry Dock).		
Girvan.	Newport.		
Ballantrae.	Weston-super-Mare.		
Cairn Ryan.	Burnham.		
Corsewall Point L.H.	Bridgewater.		
Mull of Galloway L.H.	Lundy Island.		
	Ilfracombe.		
	Bull Point L.H.		
	Barnstaple.		
	Appledore.		

[*Continued*

NORTHERN.	WESTERN.	SOUTHERN.	EASTERN.
	Bristol Channel —*cont.*		
	Hartland Pt. L.H.		
	Boscastle.		
	Port Isaac.		
	Newquay.		
	Hayle.		
	Godrevy L.H.		
	St. Ives.		
	St. Sennen.		
	Newlyn, West.		
	Penzance.		
	Scilly.		

APPENDIX IX.

Fishery Barometers.

List of Places supplied with Fishery Barometers.

Shetland Isles.—Balta Sound, Uya Sound, Burravoe, Nesting, Lerwick, Sandwick, Scalloway, Symbister.

Orkney Isles.—Westray, Papa Westray, Burray, Kirkwall.

Scotland, east coast.—Duncansbay, Freswick, Auchengill, Keiss, Ackergill, Staxigoe, Wick, Lybster, Dunbeath, Inver, Portmahomack, Ballintore, Cromarty, Avoch, Nairn, Burghead, Portessie, Port Knockie, Portsoy, Whitehills, Gardenstown, Rosehearty, Pitullie, Fraserburgh, Inverallochy, Pointlaw, Findon, Portlethen, Skateraw, Stonehaven, Arbroath, East Haven, Broughty Ferry, St. Andrews, Crail, Cellardyke, St. Monance, Burntisland, Newhaven.

England, east coast.—Berwick, North Shields, South Shields, Sunderland, West Hartlepool, Staithes, Scarborough, Filey, Flamborough, Bridlington Quay, Withernsea, Hull, Lynn (2), Wells, Gorleston, Lowestoft, Orford Haven, Felixstowe, Harwich, Brightlingsea, West Mersea, Maldon, Leigh, Margate, Deal, Kingsdown, Dover.

England, south coast.—Bognor, Ryde, Bembridge, Brixton, Atherfield, Ventnor, Yarmouth (Isle of Wight), Gorey (Jersey), Haslar Hospital, Poole, Weymouth, Portland, Budleigh Salterton, Exmouth, Cawsand, Mevagissey, Gorranhaven, Devoran, Portscatho, Penryn, Durgan, Porthallow, Falmouth, Coverack, Newlyn (2), Mousehole, Penberth, Porth Guarra.

England, south-west coast.—St. Ives, Hayle, Port Isaac, Boscastle, Bideford, Burnham, Highbridge, Weston-super-Mare.

Wales.—Briton Ferry, Swansea, Angle, Milford, Aberystwyth, Nevin, Carnarvon.

England, north-west coast.—Fleetwood, Morecambe, Maryport.

Isle of Man.—Douglas, Port St. Mary, Peel (2).

Scotland, south-west coast.—Port Patrick, Stranraer.

Ireland, east coast.—Cushendall, Belfast, Bangor, Groomsport, Donaghadee, Ardglass, Warren Point, Carlingford, Greenore, Dundalk, Malahide, Howth, Kingstown (2), Bray, Wicklow.

Ireland, south coast.—Dunmore East, Dungarvan, Crosshaven, Kinsale, Union Hall, Castletownsend, Baltimore, Schull (2), Crookhaven, Castletown (Berehaven), Lawrence Cove, Ballydonegan, Ballycrovane.

Ireland, west coast.—Valencia, Dingle, Tralee, Ballyheigue, Tarbert, Kilcredane, Kilronan, Galway, Spiddal, Elly Bay, Cleggan, Ballyglass, Ballycastle (Co. Mayo), Donegal, Tribane, Killybegs, Teelin, Malinmore, Portnoo, Burton Port, Kincaslagh, Bunbeg.

Ireland, north coast.—Dunfanaghy, Rathmullen, Buncrana, Malin Head, Moville, Greencastle, Portstewart, Portrush, Port Ballintrae, Ballycastle (Co. Antrim).

Scotland, west coast.—Lamlash, Tarbert (Loch Fyne), Loch Ranza, Campbeltown, Carradale, Portnahaven and Portwemyss (Islay), Portree and Armadale (Isle of Skye), Isle of Soay, Plockton, Ardneaskan, Shieldaig, Gruinard, Badachro, Ullapool, East Mey, Gills, Stroma (2).

Hebrides.—Stornoway, Portnaguran, Obb, Valtos, Carloway, Ness.

APPENDIX X.

Methods followed in dealing with Meteorological Returns from Land Stations in the British Isles.

These stations are of seven classes, as stated on page 16.

I.—*Observatories continuously observing all the Meteorological Elements.*

Returns from observatories.

Hourly measurements of the curves obtained from the self-recording instruments at the observatories of the Office are made by the observers at each station, on printed forms supplied for the purpose, which, together with the curves, are forwarded to the Office weekly. They comprise measurements of the barograms, of the dry-bulb and wet-bulb thermograms, of the anemograms, and of the rain-gauge curves.

Examination of returns.

The measurements are subjected to a careful examination in order to ensure as far as possible their accuracy, and the revised regulations which have been adopted to secure this end will be found in the Report of the Office for 1890. They comprise rules for the guidance of the observers, as well as of the assistants charged with the examination of the work at the Office. Attention need be called here to only two of these rules, viz., (*a*) the use of subsidiary sheets on which are entered the results of a second set of measurements of the curves made after, and quite independently of, the first set, and with a different form of scale, the two sets of measurements being afterwards compared together, and any differences found inquired into and set right; and (*b*) the re-measurements of the curve made by the assistants at the Meteorological Office, and which always amount to 40, and in doubtful cases to many more, per month, for each element.

Results of examination and report to Council.

The attention of the observers is always drawn to such errors as may be detected, and to any failures in the continuity of the curves arising from failure of the light, stoppage of the clock, defective photography, faulty action of the wet-bulb thermometer, &c.; a report containing the results of the examination of each observatory being also submitted to the Council periodically. The tabulations are eventually bound and stored with the curves in the Office.

General supervision of observatory work.

In connection with this work should be mentioned the general watch which has to be kept over the working of the observatories and of the instruments, not only to secure uniformity amongst them and observance of rules, but also to guard against small changes which are liable to occur at certain times, especially with the thermographs, and which may affect the scale-values of the instrument or the datum lines used for the tabulation of the curves. About twice a year this work calls for special examination, entailing some considerable time, and occasionally the engraving of new scales, for measuring the curves.

Method of dealing with the Numerical Results from the Self-recording Observatories.

Interpolations.

In dealing with the tabulations the first step is to go over the sheets and fill up by interpolation, wherever possible, any gaps or breaks in the continuity of the record.

The records having been made as complete as possible, are then used for the calculation of daily and hourly mean values, for periods of five days, calendar months, and for the year; which, together with other data obtained from the same source, are published under the title of "Hourly Means of the Readings obtained from the Self-Recording "Instruments at the Five Observatories under the Meteorological "Council." The volumes for 1895 and 1896 are in the press. See p. 18.

It will be noticed that this publication includes results from only five observatories, while on page 16 seven observatories are mentioned. This is owing to the fact that since the year 1884 the records at Glasgow and Stonyhurst have not been fully published by the Office (although the stations are partially subsidized by it, in order to maintain the record established in 1868 and published for the years 1869 to 1883), where, however, the curves are stored for future use if required.

Returns from both these observatories are published in "Returns from Stations of the Second Order," and meteorological results for Stonyhurst and Falmouth are printed independently by the College authorities, and by those of the Royal Cornwall Polytechnic Society.

II.—*Anemographic Stations at which the Wind is recorded continuously.*

Anemographs.

The anemograms received from Alnwick Castle, Armagh, Deerness, Dublin, Fleetwood, Holyhead, North Shields, Scilly, and Yarmouth are regularly examined and tabulated in the Office (except those for Armagh, which are tabulated at the Observatory), and the sheets bound up in volumes. Besides special inquiries on legal and other points which arise from time to time, and in which these documents are of high importance, the tabulations are always employed in the preparation of the various Reports issued by the Office. They are also regularly used in the checking of the Storm Warnings.

III.—*Barographic Stations at which the Atmospheric Pressure is continuously recorded.*

Barographs.

These stations are for the most part either telegraphic reporting stations or stations of the second or third orders. The instrument in most general use is Richard's self-recording aneroid. At the telegraphic stations the record is first used to indicate to the observers the changes which have occurred since the last observing hour, and these changes, when large, are reported by wire to London, and are used in preparing the forecasts. The curves themselves are forwarded to the Office weekly and are stored for future use.

IV.—*Sunshine Stations at which the duration of Bright Sunshine is continuously recorded.*

Sunshine records.

The daily sunshine cards which are now received from 60 Stations in the British Islands are examined generally, to guard against accidental changes in the adjustment of the instruments. Notes explaining any omission or accidental defect are added to the cards, if required, and after their receipt has been acknowledged, they are duly stamped, dated and then stored in the Office. It should, however, be added, that returns of sunshine are received from other stations, at which the original records are retained.

A tabulation of most of the curves is published in the Weekly Weather Report, mentioned in Appendix VI., and for those stations, which are also Stations of the Second Order, the monthly totals of bright sunshine in hours, together with the per-centages of its possible duration, are published as Part IV. of "Returns from Stations of the Second Order." Hourly tabulations are made in the Office of the returns from the observatories, and the mean hourly amounts are published in the volumes of "Hourly Means." A table showing the daily amount of sunshine at Bunhill Row, one of the London stations, is also prepared quarterly, for the Royal Meteorological Society. Weekly totals.

V.—*Telegraphic Reporting Stations.*

These are 30 in number in these islands, and the particulars as to the observations taken at them, and the methods adopting in dealing with them, will be found fully detailed in Appendix VII. to the Report for 1888-89, and in Appendix VI. to the present volume.

VI.—*Land Stations.*

Ever since the year 1866 returns of more or less completeness have been received from land stations in the United Kingdom. Origin and progress of system.

The number of stations has gradually increased until at the end of March, 1899, the total number was 161, including 16 belonging to the Royal Meteorological Society and 19 belonging to the Scottish Meteorological Society. Copies of these latter returns are sent to the Office under special arrangements with both Societies.

The Stations of the Second Order are 84 in number, and distributed as follows:—46 in England, 3 in Wales, 25 in Scotland, and 10 in Ireland.

The methods followed with regard to the examination and publication of these returns have been fully detailed in previous reports, and need not now be repeated. The changes introduced into the volume for 1886 have been continued in those for later years. These refer to the barometer readings, which are now given at station-level instead of being reduced to the mean sea-level; and to the humidity, where the depression of wet bulb is shown, the international forms A and B being modified accordingly.

The volume of "Returns from Stations of the Second Order" for 1895 contained returns from 72 stations and that for 1896, now in the Press, will contain returns from 75 stations.

Arrangements have been made under which it is hoped that the arrears of this publication will be rapidly reduced.

Reports from the Irish stations are regularly supplied to the Registrar-General for Ireland for his Weekly and Quarterly Returns.

When an application for the adoption of a new station is received, a schedule is forwarded to the observer containing a series of questions as to the outfit of the station, the exposure of the instruments, and the influence likely to be exerted on their indications by surrounding objects, such as houses and trees. Only mercurial barometers are New stations.

accepted, and only such as have been duly verified. All thermometers must have been tested at Kew. A plan of the station, showing the positions of the instruments with regard to neighbouring objects, is also required.

On the return of this schedule the answers are considered, and, where necessary, alterations are advised.

If, however, the existing arrangements are satisfactory, tables for reducing the barometer readings to 32° Fahrenheit at mean sea-level are prepared and duplicates sent to the observer, together with a set of Hygrometrical Tables, and a copy of "Instructions in the Use of Meteorological Instruments."

The first returns are compared and examined with special care, and a report of the result of the examination is forwarded to the observer, with instructions how best to improve and complete the returns.

There are still many parts of the British Islands very poorly represented by the existing stations; for instance, Wales, the northern coasts of Cornwall and Devon, Somersetshire, Essex, the south-east of Ireland, &c., and any information for these districts would be valuable.

VII.—*Land Stations of the Third Order.*

These are 77 in number. The information supplied from them is, in some cases, similar to that supplied by a station of the second order, but taken only once daily, or at irregular hours, or perhaps less complete. At other stations less detail is given; for instance, 43 stations furnish only the daily rainfall. All the information thus afforded is utilised in some way or other, though it is not all included in the Office publications. The rainfall values are copied and supplied to Mr. Symons, F.R.S., for publication in "British Rainfall."

Inspection.

All the Stations supplying information to the Office are inspected. Some of them are visited every year, but the less important stations are not visited so frequently. Extracts from the reports of the inspectors will be found in Appendix V., p. 50.

List of Stations.

In Appendix XI., page 89, is given a complete list of the stations supplying information to the Office.

APPENDIX XI.

List of Stations in the British Islands from which Information has been received at the Meteorological Office during the year ending March 31st, 1899.

The Stations marked "S" are in connexion with the Scottish Meteorological Society, and those marked "R" are in connexion with the Royal Meteorological Society. The returns from these Stations are received by the Office under an arrangement which will be found detailed in previous reports.

In certain cases where the actual station at which the Observations have been taken is not generally known, and could not be readily identified, the name of some village or town near has been inserted following the name of the station, within brackets.

The nature of the information received from each station is indicated by letters as follows:—

A. *Observatories.*—Continuous record of pressure, temperature, wind, sunshine and rain, with eye observations of the amount, form, and motion of the clouds, and notes on the weather.

B. *Anemographic Stations.*—Continuous record of the direction and velocity (or force) of the wind.

C. *Barographic Stations.*—Continuous record of pressure.

D. *Second Order Stations.*—Monthly sheets, containing the regular observations at 9 a.m. and 9 p.m. each day, local time, of pressure, temperature (dry bulb and wet bulb), wind, cloud, and weather, with the daily maxima and minima of temperature, the daily rainfall, and general remarks on the weather.

E. *Second Order Stations.*—Monthly means and summaries on Form B. of observations taken at 9 a.m. and 9 p.m., each day as above.

F. *Climatological Stations.*—The maximum and minimum temperature and the rainfall for each day, with remarks on the weather. This information is received in the Meteorological Office each week for use in the "Weekly Weather Report."

G. *Third Order Stations.*—Observations of the same kind as at Second Order Stations, but either:—

(*a*) less full.
(*b*) taken only once daily.
(*c*) Taken at hours other than 9 a.m. and 9 p.m.

R. *Rainfall Stations.*—Monthly sheets containing the daily observations of the amount of rainfall, with remarks on the weather.

S. *Sunshine Stations.*—Continuous record of bright sunshine.

T. *Telegraphic Stations.*—Regular observations at 8 a.m. and 6 p.m. G.M.T. (and from some stations at 2 p.m. in addition), of pressure, temperature, wind and weather, with the daily maxima and minima of temperature, the daily rainfall, and where possible, the sea-disturbance at 8 a.m. each day and the daily amount of bright sunshine. This information is received at the Meteorological Office each day by telegraph, for use in the "Daily Weather Report" and, as required, for use in the "Weekly Weather Report."

W. *Sea-temperature.*—Daily observations of the temperature of the sea water.

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	° ′	° ′				
Aberdeen Observatory ..	57 10	2 6 W.	46	Prof. C. Niven ..	A. T. C	55, 67
,, Cove Bay	57 9	2 5 ,,	—	Coastguard	W.	—
Aberdovey	52 33	4 4 ,,	—	John Edwards ..	S.	—
Alnwick Castle	55 25	1 43 ,,	210	Humphry Willyams, for the Duke of Northumberland.	B. F.	68, 69
Ardrossan, Ayrshire ..	55 38	4 50 ,,	15	J. W. Mayes	T.	54
Arlington Court (Barnstaple)	51 8	3 58 ,,	613	Lady Chichester ..	F.	—
Armagh Observatory ..	54 21	6 39 ,,	196	J. L. E. Dreyer ..	B.D.F.S.	70, 73
Arran, North, Galway ..	53 6	9 40 ,,	—	Coastguard	G. W.	—
Aspley Guise, Beds.	52 1	0 38 ,,	410	E. E. Dymond ..	S.	—
Aysgarth Vicarage, Yorks.	54 18	1 58 ,,	646	Rev. F. W. Stow ..	D.	—
Bahama Bank Lightship ..	54 20	4 13 ,,	—	Light-keepers ..	W.	—
Ballantrae, Ayrshire ..	55 6	5 0 ,,	—	Coastguard	W.	—
Ballydonegan, Co. Cork ..	51 38	10 3 ,,	—	,, ...	G. W.	—
Ballyglass, Co. Mayo ..	54 17	9 52 ,,	—	,, ...	W.	—
Baltimore, Co. Cork	51 28	9 22 ,,	—	,, ...	G.	—
Bantry	51 41	9 27 ,,	—	R. Brennan	R.	—
Belmullet, Co. Mayo ..	54 13	9 59 ,,	40	Miss E. Tolan ..	T.	50
Belvoir Castle (Grantham)	52 54	0 47 ,,	359	W. H. Divers, for the Duke of Rutland.	D.	60
S Ben Nevis	56 48	5 0 ,,	4,406	A. Rankin, for Directors Ben Nevis Observatory.	A. E. S.	—
M Bennington, Herts.	51 54	0 5 ,,	407	Rev. J. D. Parker ..	E.	—
M Berkhamsted	51 46	0 34 ,,	400	E. Mawley	E.	—
Bidston Observatory (Liverpool).	53 24	3 4 ,,	188	W. E. Plummer ..	D. T.	—
Birr Castle (Parsonstown)	53 6	7 55 ,,	175	J. Spooner and T. Colvin, for the Earl of Rosse.	D. S. T.	51
M Blackpool	53 48	3 3 ,,	31	A. J. Anderson ..	F. S.	—
Blacksod Point, Co. Mayo ..	54 6	10 4 ,,	—	Coastguard	W.	—
Bognor	50 47	0 40 ,,	—	H. C. E. Morris ..	S.	—
Bolton	53 35	2 27 ,,	389	W. W. Midgley ..	G.	—
Bournemouth	50 43	1 53 ,,	—	Messrs. Primavesi, for Town Council.	S.	59
S Braemar	57 0	3 24 ,,	1,111	J. Aitken	D. F. S.	—
Bramley, Surrey	51 11	0 33 ,,	148	J. Bartlett	D.	58
Bray, Co. Wicklow	53 12	6 6 ,,	—	Coastguard	G.	—
Brighton	50 49	0 8 ,,	—	A. Newsholme ..	S.	—
Burford, Oxon	51 48	1 38 ,,	420	M. Jacobs	R.	—
Burnmouth (Ayton, Berwick)	55 51	2 4 ,,	—	Coastguard	W.	—
Burntisland	56 4	3 14 ,,	—	,, ...	W.	—
M Buxton	53 14	1 54 ,,	987	H. Harrison and H. L. Apthorpe.	E.	—
Caernarvon Bay Lightship	53 6	4 45 ,,	—	Light-keepers ..	W.	—
Cambridge	52 13	0 6 E.	88	Miss A. Walker ..	T. S.	60, 61
Campden, Glos.	52 5	1 46 W.	524	Capt. W. Wright, R.A.	R.	—
Cardigan Bay Lightship ..	52 25	5 1 ,,	—	Light-keepers ..	W.	—
S Cargen	55 2	3 37 ,,	72	A. Peacock	E.	—
Carrigallen, Co. Leitrim ..	53 58	7 38 ,,	? 350	Mrs. J. Godley and Miss Morrow.	R.	—
Castletown, Bere	51 39	9 54 ,,	—	Coastguard	G.	—
Castletownshend, Co. Cork	51 32	9 11 ,,	—	Coastguard	G.	—
Chatham	51 23	0 32 E.	136	The Instructor in Surveying.	G.	—
M Cheadle	52 58	1 57 W.	646	J. C. Philips	E. F.	—
M Cheltenham	51 54	2 3 ,,	184	R. Tyrer	E.	—
Chester	53 12	2 54 ,,	59	Rev. J. Cairns Mitchell.	D.	—
Churchill, Oxon	51 56	1 34 ,,	509	Giles Edmonds ..	R.	—
M Churchstoke	52 31	3 5 ,,	538	P. Wright	D. F. S.	—
Cirencester	51 43	1 57 ,,	446	Prof. Ohm	F. S.	—
Cleggan, Co. Galway ..	53 33	10 8 ,,	—	Coastguard	W.	—
Clifton	51 27	2 37 ,,	230	D. Rintoul	F.	—
Colly Weston	52 37	0 31 ,,	280	Miss A. Tasker ..	R.	62
Colwyn Bay	53 17	3 43 ,,	—	R. E. Lord	S.	—
Coningbeg Lightship ..	52 2	6 40 ,,	—	Light-keepers ..	W.	—
Cooper's Hill (Egham) ..	51 26	0 34 ,,	279	Prof. H. McLeod ..	G.	58
Cranleigh	51 8	0 29 ,,	—	Rev. G. C. Allen ..	F.	—
Cromarty	57 41	4 0 ,,	—	Coastguard	W.	—
Cronkbourne (Douglas) ..	54 10	4 29 ,,	137	A. W. Moore	D. F. S.	—
Crookhaven	51 28	9 43 ,,	—	Coastguard	G.	—
Crosshaven	51 48	8 18 ,,	—	,, ...	G.	—
Cuckfield, Sussex	51 1	0 9 ,,	389	John Howe	R.	—

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Cullen	57 41	2 49 W.	18	R. A. J. Glover	D.	55
⚓ Cullompton	50 51	3 23 „	202	T. Turner	F. S.	—
Currygrane (Edgeworthstown), Co. Longford.	53 45	7 39 „	267	J. M. Wilson	D. F.	—
Darwen, Lancashire	53 41	2 28 W.	710	G. Mainland	S.	64
Deerness, Orkney Islands	58 56	2 45 W.	160	M. Spence	B. D. S.	54, 67
Disserth (Llandrindod)	52 13	3 24 „	711	Rev. J. Le Herbert	R.	—
Dolmelynllyn (Dolgelly)	52 47	3 53 „	—	W. Simmonds, for C. R. Williams.	R.	—
Donaghadee	54 38	5 32 „	26	T. MacGowan	T.	50
Doneraile, Co. Cork	52 13	8 34 „	266	Captain Evans	R.	—
Dover	51 7	1 18 E.	198	H. E. Stilgoe	R.	—
Dublin, Botanic Gardens	53 23	6 16 W.	67	F. W. Moore	D.	50
„ City	53 20	6 15 „	47	J. W. Moore	D. F.	50
„ Phœnix Park	53 22	6 21 „	155	Col. Hellard, R.E	B. D. S.	71, 74
Duddington	52 36	0 32 „	152	Fred Coventry	F. R.	61, 62
§ Dundee	56 28	2 56 „	160	J. Carnochan	D. S.	55
Dungeness	50 55	0 59 E.	26	W. Grimmer	T.	57
§ Dunrobin Castle	57 59	3 56 W.	12	D. Melville, for the Duke of Sutherland.	D.	54
Durham	54 46	1 35 „	336	H. J. Carpenter	D. F. S.	56
Dursley (Farnley), Glos.	51 41	2 21 „	250	R. W. Pinney	R.	—
Eastbourne	50 46	0 17 E.	39	R. Sheward	D. S.	58
East Goodwin Lightship	51 13	1 36 „	—	Light-keepers	W.	—
East Dereham	52 41	0 57 „	158	G. H. H. Cooper	R.	—
Edgbaston (Birmingham)	52 28	1 56 W.	534	Alf. Cresswell	D. S.	61
Edinburgh	55 57	3 12 „	253	R. C. Mossman	D. S.	55
English and Welsh Grounds Lightship.	51 27	3 0 „	—	Light-keepers	W.	—
Ennis, Co. Clare	52 51	8 59 „	38	Miss A. L. Scott	R.	—
Falmouth	50 9	5 4 „	167	E. Kitto	A. F.	72
Felixstow	51 58	1 22 E.	—	Rev. J. G. Munday	F. S.	—
Fleetwood	53 56	3 1 W.	—	M. S. Gaulter	B.	70
Forgandenny, Perth	56 21	3 29 „	175	C. L. Wood	C.	—
Forrest Row, Sussex	51 7	0 2 E.	619	J. Bryce	R.	—
§ Fort Augustus	57 8	4 40 W.	68	Rev. J. M. Wall	E. F. S.	54
Fort William	56 49	5 7 „	31	A. Rankin, for Directors, Ben Nevis Observatory.	A. F.	54, 66
Foynes, Co. Limerick	52 37	9 7 „	108	Lord Monteagle	F.	—
Fulbeck, Lincolnshire	53 3	0 37 „	185	Rev. Vere F. Willson	C. D.	61
Geldeston (Beccles)	52 28	1 31 E.	37	E. T. Dowson	D. F. S.	—
Gilcrux (Maryport)	54 44	3 23 W.	261	J. Monkhouse	D. F. S.	64
Glasgow	55 53	4 18 „	180	Prof. L. Becker	A. D. F.	66
§ Glencarron	57 30	5 14 „	489	D. D. Munro	E. F.	—
§ Glenlee	55 5	4 12 „	203	W. Melville	E. F.	—
§ Gordon Castle	57 37	3 5 „	101	C. Webster, for the Duke of Richmond and Gordon, K.G.	E.	—
Gorleston (Gt. Yarmouth)	52 35	1 43 E.	—	R. J. C. Day	G.	—
Haslar Hospital, Hants.	50 47	1 7 W.	—	R. Harring	G.	—
Hawes Junction	54 19	2 18 „	1,135	W. H. Bunce	G.	64
Hesley Hall (Bawtry)	53 27	1 4 „	65	B. I. Whitaker	F.	—
⚓ Hereford	52 5	2 45 „	295	C. S. Morrison	F.	—
Heysham Hall, Lancashire	54 3	2 54 „	95	S. Lomas, for Miss L. Grafton.	D.	64
⚓ Hillington	52 48	0 33 E.	88	Rev. H. E. B. Ffolkes	D. F. S.	—
Hollesley Bay, Suffolk	52 3	1 27 „	38	Prof. C. G. F. Thonger.	D. S.	61
Holyhead, Harbour Office	53 18	4 39 W.	57	F. M. Cotton	B. W.	69
„ Sailors' Home	53 18	4 39 „	48	T. Chope	T.	73
Hoylake, Cheshire	53 23	3 12 „	—	T. Foster	S.	—
Hurdlestown (Broadford), Co. Clare.	52 48	8 38 „	157	Lieut.-Col. W. O. Bentley, R.A.	R.	—
Hurst Castle	50 42	1 33 „	12	E. T. Tremble	T.	57
Kearsney Abbey (Dover)	51 8	1 17 E.	? 100	C. W. Curtis	R.	—
Ketton Hall (Stamford)	52 38	0 32 W.	—	J. H. Browett	R.	—
„ Vicarage	52 38	0 32 „	109	Rev. A. Swire	R.	—
Kew Observatory	51 28	0 19 „	18	C. Chree	A.	—
Kilcredane, Co. Clare	52 35	9 47 „	—	Coastguard	W.	—
Kilkenny	52 39	7 14 „	212	H. Carlton, for the Marquis of Ormonde.	C. F.	51

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M	Killarney	52 4	9 30 W.	86	Ven. Archdeacon Wynne.	G. F.	—
	Killiney, Co. Dublin ..	53 16	6 7 „	249	R O'Brien Furlong	R.	—
	Kirkby Lonsdale	54 12	2 36 „	—	J. K. Picard	R.	—
	Kirkwall	58 59	2 57 „	—	Coastguard	W.	—
	Kish Bank Lightship ..	53 19	5 55 „	—	Light-keepers ..	W.	—
	Ladylaw (Hawick)	55 28	2 47 „	447	T. Wilson	D.	55
	Lahinch, Co. Clare	52 55	9 21 „	52	Miss J. Bowes ..	R.	—
S	Lairg	58 1	4 22 „	335	Rev. D. Macrae ..	E. F.	54
	Lamlash, Isle of Arran ..	55 32	5 8 „	—	Coastguard	G. W.	—
	Laudale, Argyleshire ..	56 41	5 41 „	14	A. Fletcher, for T. H. G. Newton.	D. F.	54
	Lawrence Cove, Co. Cork ..	51 38	9 50 „	—	Coastguard	G.	—
S	Lednathie	56 45	3 7 „	719	W. Morrison, for P. Stormonth Darling.	E.	—
	Leith	55 58	3 10 „	20	T. Richardson ..	T.	55
	Leman and Ower Lightship	53 8	2 2 E.	—	Light-keepers ..	W.	—
	Lerwick	60 9	1 8 W.	—	Coastguard	W.	—
	Limerick	52 39	8 36 „	—	A. W. Shaw	R.	—
	Liscannor, Co. Clare ..	52 56	9 23 „	—	Coastguard	W.	—
S	Lissan, Co. Tyrone	54 41	6 45 „	300	The late Sir N. Staples, Bt.	E.	50
	Llandinam, Montgomery ..	52 29	3 26 „	500	John Owens	R.	—
	Llandovery	51 59	3 48 „	217	J. Watkins	F.	—
M	Llandudno	53 21	3 50 „	88	J. Nicol	E. F.	—
	„	53 21	3 51 „	?20	Wm. Little	S.	—
	London, Brixton	51 27	0 8 „	77	F. Gaster	T.	—
	„ City	51 31	0 5 „	80	Messrs. de la Rue ..	S.	—
	„ Hampstead ..	51 34	0 10 „	—	H. R. Beeton ..	C.	—
	„ Pall Mall	51 30	0 7 „	—	Athenæum Club ..	C.	—
	„ Westminster ..	51 30	0 8 „	76	The Staff of the Met. Office.	C. G.	—
	„ Westminister Training College.	51 30	0 8 „	—	H. A. Reatchlous ..	S.	—
	Londonderry	55 0	7 19 „	67	J. Conroy	D. F.	—
	Loughborough	52 47	1 12 „	169	W. Berridge	T.	60
	Lowestoft	52 29	1 44 E.	—	C. J. Heppell ..	G.	—
M	Lowestoft	52 29	1 44 „	85	S. H. Miller	E.	—
	Lytham	53 44	2 58 W.	21	J. H. Jenkins ..	D. S.	64
	Maidenhead	51 30	0 43 „	90	G. H. Palmer ..	G.	—
	Malin Head, Co. Donegal ..	55 23	7 24 „	230	J. Williams	T. C.	50
	Manchester	53 29	2 13 „	190	J. Niven	D.	63
S	Marchmont	55 44	2 25 „	498	J. A. Wood	E. F. S.	55
M	Margate	51 24	1 24 E.	83	J. Stokes	S.	59
	Market Rasen	53 23	0 20 W.	83	W. B. Jevons ..	R.	62
	Markree Castle, Co. Sligo ..	54 11	8 27 „	122	F. W. Henkel, for Col. Cooper.	D. F. S.	50
	Minard, Co. Kerry	52 7	10 8 „	—	Coastguard	W.	—
	Morpeth	55 13	1 41 „	324	G. P. Berry	D. S.	56
	Mount Callan (Inagh), Co. Clare.	52 53	9 16 „	479	Lt.-Col. Tottenham	R.	50
	Nairn	57 36	3 52 „	34	Miss Penny	T.	54
	Newarp Lightship	52 45	1 53 E.	—	Light-keepers ..	W.	—
	Newcastle, Co. Wicklow ..	53 5	6 6 W.	256	B. H. Steede	D.	50
	Newcastle-on-Tyne ..	54 59	1 36 „	152	N. H. Martin ..	G. S.	58
	Newmarket-on-Fergus ..	52 46	8 53 „	—	W. W. FitzGerald ..	R.	51
	Newport, Monmouth ..	51 35	3 0 „	—	C. Cullum	R.	—
	Newquay, Cornwall ..	50 25	5 4 „	?250	J. Pearce	S.	59
	„ „ ..	50 25	5 5 „	—	Coastguard	W.	—
	Northallerton	54 20	1 26 „	129	W. Stead	R.	—
	North Foreland	51 23	1 27 E.	115	S. Jenkins	T.	57
	North-West Lightship ..	53 31	3 31 W.	—	Light-keepers ..	W.	—
M	Norwood	51 26	0 6 „	220	W. Marriott	E.	—
S	Ochtertyre	56 23	3 53 „	329	G. Croucher, for Sir P. K. Murray, Bt.	E. F.	54
	Omagh	54 36	7 19 „	300	Col. Buchanan ..	F.	50
	Oswaldkirk, Yorkshire ..	54 12	1 3 „	—	R. Thompson ..	S.	—
	Outer Dowsing Lightship	53 27	1 5 E.	—	Light-keepers ..	W.	—
	Owers Lightship	50 39	0 41 W.	—	„	W.	—
	Oxford	51 46	1 16 „	208	W. Wickham ..	T. S.	73
	Parkstone, Dorset	50 43	1 56 „	197	R. H. Barnes ..	D.	58
	Penbedw (Mold)	53 12	3 11 „	650	H. W. Buddicom ..	C.	—
	Pennant Bay (Aberdour) ..	57 40	2 16 „	—	Coastguard	W.	—

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S	Pinmore (Girvan)	55 12	4 49 W.	187	P. Donald, for Capt. Hamilton.	E.	—
	Plumstead	51 29	0 6 E.	—	J. G. Waller	S.	—
	Plymouth, The Hoe.. ..	50 22	4 8 W.	116	H. Victor Prigg ..	D. F. S.	58
S	Poltalloch	56 8	5 30 „	132	D. S. Melville, for Lord Malcolm.	E.	54
	Portrush	55 13	6 40 „	—	Coastguard	W.	—
	Port Talbot	51 34	3 45 „	—	J. Hollingworth, for Miss Talbot.	S.	—
	Prawle Point	50 12	3 43 „	332	T. Howse	T.	57
	Prestwich (Manchester) ..	53 32	2 17 „	320	T. R. H. Clunn ..	D. F. S.	—
	Quin, Co. Clare	52 48	8 52 „	—	Mrs. Hallam Studdert.	R.	—
	Rede Court (Rochester) ..	51 24	0 29 E.	224	W. H. Tingey ..	D.	—
	Ridgmont	52 1	0 36 W.	291	H. A. Mann	D.	61
	Roche's Point, Co. Cork ..	51 47	8 15 „	42	W. Kennedy ..	T.	—
	Rochford (Tenbury) ..	52 18	2 36 „	316	Rev. John Tomson	C. R.	—
S	Rosewell	55 51	3 7 „	690	R. B. Mitchell ..	E.	—
	Rothamsted	51 48	0 22 „	368	Sir J. B. Lawes and Sir J. H. Gilbert.	F. S.	—
S	Rothesay	55 50	5 4 „	115	J. Kay..	E.	54
M	Rounton, Yorkshire ..	54 24	1 18 „	249	Sir L. L. Bell, Bart...	E.	—
M	Rousdon, Devon	50 43	3 0 „	515	Sir C. E. Peek, Bart.	E.	—
	Roxborough, Co. Limerick	52 35	8 36 „	111	A. W. Shaw	R.	—
	Royal Sovereign Lightship	50 43	0 27 E.	—	Light-keepers ..	W.	—
	Rugby	52 22	1 15 W.	379	E. Kitchener ..	G.	62
	St. Ann's Head, Pembroke	51 41	5 11 „	150	H. T. Knott	T. S. W.	51
	St Aubin's, Jersey	49 12	2 11 „	25	J. Fisher	T.	57
	St. David's, Pembrokeshire	51 53	5 16 „	215	W. P. Propert ..	D.	51
	St. Helen's, Lancashire ..	53 28	2 45 „	151	F. Drew Harris ..	G.	63
	St. Heliers, Jersey	49 11	2 6 „	—	Signal Officer, Fort Regent.	S.	59
	St. Leonard's	50 51	0 33 E.	178	H. Colborne.. ..	D. F. S.	58
	„ (West Marina)	50 51	0 32 „	—	T. Eldridge	G.	58
	St. Peter Port, Guernsey ..	49 32	2 32 W.	—	F. E. Carey	S.	—
	Salcombe, Devon	50 14	3 46 „	—	Coastguard	W.	—
	Sandgate, Kent	51 4	1 9 E.	56	A. Robert Bowles ..	R.	—
M	Scarborough	54 18	0 24 W.	159	E. W. Ellerbeck ..	D. F. S.	—
	„	54 17	0 23 „	—	Coastguard	W.	—
	Schull	51 32	9 32 „	—	„	G.	—
	Scilly Islands, St. Mary's ..	49 56	6 18 „	80	A. Hicks	B. S. T. W. C.	72, 74
	Seafield, Co. Clare	52 48	9 30 „	—	Coastguard	W.	—
	Seaham Harbour	54 50	1 19 „	148	G. H. Aird	D.	56
	Seven Stones Lightship ..	50 4	6 5 „	—	Light-keepers ..	W.	—
M	Shaftesbury	51 1	2 12 „	—	Miss L. Wand ..	F.	—
	Shambles Lightship ..	50 31	2 20 „	—	Light-keepers ..	W.	—
	Sheffield..	53 23	1 29 „	429	E. Howarth	D. S.	—
	Sheephaven (Dunfanaghy)	55 11	7 58 „	—	Coastguard	W.	—
	Shields, North..	55 0	1 27 „	97	W. B. Clark	T.	69
	Shields, North, High Lighthouse.	55 0	1 27 „	—	Captain Harrison ..	B.	68
	Shipwash Lightship ..	52 2	1 38 E.	—	Light-keepers ..	W.	—
	Shirley (Birmingham) ..	52 25	1 49 W.	460	B. Boothroyd ..	F.	—
	Skipton	53 58	2 9 „	567	W. Farrer	G.	—
	Solway Lightship	54 48	3 32 „	—	Light-keepers ..	W.	—
	Southampton	50 55	1 24 „	78	J. T. Cook, for Dir. Gen. of Ordnance Survey.	D. F. S.	58
	Southport	53 39	2 59 „	37	J. Baxendell.. ..	S.	—
	South Rock Lightship ..	54 25	5 22 „	—	Light-keepers ..	W.	—
	Spiddal, Co. Galway ..	53 15	9 17 „	—	Coastguard	G.	—
	Spurn Head	53 34	0 7 E.	19	G. Freeman	T.	50
	Spurn Lightship	53 34	0 13 „	—	Light-keepers ..	W.	—
	Stokesay (Craven Arms) ..	52 26	2 52 W.	370	Miss M. A. Digues La Touche.	D.	—
	Stonyhurst College	53 51	2 28 „	375	Rev. W. Sidgreaves	A. D. F.	65, 69
	Stornoway	58 11	6 22 „	28	J. Mackenzie ..	T. S. C.	54
	„	58 11	6 22 „	—	Coastguard	W.	—
	Stranraer	54 54	5 2 „	—	„	G.	—
	Strathpeffer-Spa, N.B. ..	57 37	4 28 „	253	J. Tregelles Fox ..	D. S.	—
	Sumburgh Head (Shetlands).	59 51	1 17 „	126	Rev. W. Brand ..	T. C.	54
	Sunderland	54 54	1 23 „	—	Coastguard	W.	—
	Symbister, Shetlands ..	60 14	1 26 „	—	J. S. Nicolson ..	G.	—
	Syston, Leicester	52 43	1 5 „	178	S. K. Daniels ..	R.	—

Station.	Lat.	Long.	Height in feet above M.S.L.	Observer.	Nature of Information supplied.	Page where Inspector's Report for 1898 will be found.
	° ′	° ′				
Tealby, Lincolnshire ..	53 24	0 16 W.	251	Rev. S. Lewin ..	D.	61
Teelin, Co. Donegal	54 38	8 39 „	—	Coastguard	W.	—
Temple Bruer, Lincolnshire	53 4	0 30 „	—	Mrs. Morley	R.	—
Tenby	51 41	4 42 „	79	W. T. Balmer ..	D. S.	—
Thurcaston (Leicester) ..	52 42	1 10 „	253	Rev. T. A. Preston..	S.	—
Tixover Hall	52 35	0 33 „	129	Capt. H. E. Hotham	R.	—
Torquay..	50 28	3 31 „	286	A. Chandler	S.	—
Totland Bay, Isle of Wight	50 41	1 33 „	84	J. Dover	G.	—
Union Hall, Co. Cork ..	51 33	9 8 „	—	Coastguard	G.	—
Uppingham	52 35	0 44 „	484	Rev. G. H. Mullins..	D.	—
Uzon (Montrose)	56 40	2 28 „	—	Coastguard	W.	—
Valencia Observatory, Cahirciveen.	51 56	10 15 „	30	J. E. Cullum.. ..	A. T. C.	51, 71
„ Island, Glanleam	51 56	10 20 „	—	Miss E. FitzGerald	R.	—
„ „ Knightstown	51 55	10 20 „	—	Coastguard	G.	—
Ventnor	50 36	1 13 „	80	Miss M. Gibson ..	S.	—
✠ Wakefield	53 41	1 30 „	96	H. Clarke	E.	—
Waterford	52 16	7 7 „	—	Harbour Authorities	C.	—
Watergate (Emsworth) ..	50 56	0 55 „	236	W. M. Christy ..	R. S.	58
Wealdstone	51 37	0 20 „	179	G. E. Eland	R.	—
Westbourne, Sussex.. ..	50 52	0 55 „	—	Rev. L. B. Birkett ..	S.	—
Westray, Orkney	59 17	3 0 „	—	J. Hewison	G.	—
✠ Whitchurch	50 32	4 6 „	593	E. E. Glyde	E.	—
Wick	58 27	3 6 „	80	J. Sinclair	T.	55
„	58 27	3 6 „	—	Coastguard	W.	—
S Wolfelee	55 23	2 39 „	587	W. Gordon	D.	55
✠ Woolacombe (Devon) ..	51 10	4 12 „	59	E. Henshall	D.	—
Worksop	53 22	1 5 „	56	H. Mellish	S.	—
Yarmouth	52 37	1 43 E.	10	G. T. Watson ..	B. T. C.	68, 69
„ Isle of Wight ..	50 42	1 29 W.	—	Coastguard	G.	—
Ynis-y-bro (Newport) ..	51 38	3 3 „	115	C. Cullum	R.	—
York, Bootham	53 57	1 5 „	—	E. B. Collinson ..	S.	56
„ The Museum	53 57	1 5 „	56	H. M. Platnauer ..	D. T.	56

In addition to those already mentioned, reports are received daily from the following Continental Stations.

Station.	Authority.	Station.	Authority.
Haparanda	Meteorological Office, Stockholm.	†The Helder	Bureau Central Météorologique, Paris.
Hernösand		Brussels	
†Stockholm		Cape Gris Nez	
Wisby		†Brest (St. Mathieu) ..	
Karlstad		Lorient (Île de Groix)..	
Bodö	Meteorological Institute, Christiania.	*†Rochefort (Ile d'Aix)..	
†Christiansund		†Biarritz	
*†Skudesnaes		†Paris	
Færder		Belfort	
		Lyons	
		Nice	
†The Scaw	Meteorological Institute, Copenhagen.	Perpignan	
Fanö		Berlin	Cent. Met. Inst. of Germany.
Cuxhaven..	Deutsche Seewarte, Hamburg.	Wiesbaden	
		Munich	
		Corunna	Observatory, Lisbon.
		†Lisbon	
		Azores (P. Delgada) ..	

Note.—The stations marked with an asterisk (*) report also at 2h. p.m., and those with dagger (†) at 6h. p.m.; Lisbon reports at 4h. p.m. instead of 6h. p.m.

The Helder does not send reports at 6 p.m. on Sundays

LIST OF BRITISH STATIONS ARRANGED UNDER COUNTIES.

County.	Station.	County.	Station.
England :—		England—*cont.*	
Bedford... ...	Aspley Guise.	Lancashire ...	Darwen.
	Ridgmont.		Fleetwood.
Berkshire ...	Maidenhead.		Heysham.
Buckingham ...	—		Lytham.
Cambridge ...	Cambridge.		Manchester.
Cheshire ...	Bidston.		Preetwich.
	Chester.		St. Helens.
	Hoylake.		Southport.
Cornwall ...	Falmouth.		Stonyhurst.
	Newquay.	Leicester ...	Belvoir Castle.
	Scilly.		Loughborough.
Cumberland ...	Gilcrux.		Syston.
Derby	Buxton.		Thurcaston.
Devon	Arlington.	Lincoln ...	Fulbeck.
	Cullompton.		Market Rasen.
	Plymouth.		Tealby.
	Prawle Point.		Temple Bruer.
	Rousdon.	Middlesex ...	London :
	Salcombe.		City.
	Tavistock.		Hampstead.
	Torquay.		Pall Mall.
	Woolacombe.		Westminster.
Dorset	Parkstone.		Wealdstone.
	Shaftesbury.	Monmouth ...	Newport.
Durham ...	Durham.		Ynis-y-bro.
	Seaham.	Norfolk... ...	East Dereham.
	Sunderland.		Geldeston.
Essex	—		Hillington.
Gloucester ...	Campden (Hidcote)		Yarmouth.
	Cheltenham.	Northampton ...	Colly Weston.
	Cirencester.		Duddington.
	Clifton.	Northumberland	Alnwick Castle.
	Dursley.		Morpeth.
Hampshire ...	Bournemouth.		Newcastle.
	Haslar.		North Shields.
	Hurst Castle.	Nottingham ...	Hesley Hall.
	Southampton.		Worksop.
	Totland Bay.	Oxford	Burford.
	Ventnor.		Churchill.
	Yarmouth.		Oxford.
Hereford ...	Hereford.	Rutland ...	Ketton Hall.
Hertford ...	Bennington.		Do. Vicarage.
	Berkhamsted.		Tixover Hall.
	Rothamsted.		Uppingham.
Huntingdon ...	—	Shropshire ...	Stokesay.
Kent	Chatham.	Somerset ...	—
	Dover.	Stafford... ...	Cheadle.
	Dungeness.	Suffolk	Felixstow.
	Kearsney.		Gorleston.
	Margate.		Hollesley Bay.
	North Foreland.		Lowestoft.
	Plumstead.	Surrey	Bramley.
	Rede Court.		Brixton.
	Sandgate.		Gooper's Hill.
Lancashire ...	Blackpool.		Cranleigh.
	Bolton.		Kew.
			Norwood.

County.	Station.
England—*cont.*	
Sussex	Bognor.
	Brighton.
	Cuckfield.
	Eastbourne.
	Forrest Row.
	St. Leonards.
	Do. West Marina.
	Watergate Park.
	Westbourne.
Warwick ..	Edgbaston.
	Rugby.
	Shirley.
Westmoreland ...	Kirkby Lonsdale.
Wiltshire ...	—
Worcester ...	Rochford.
Yorkshire ...	Aysgarth.
	Hawes.
	Northallerton.
	Oswaldkirk.
	Rounton.
	Scarborough.
	Sheffield.
	Skipton.
	Spurn Head.
	Wakefield.
	York.
Wales :—	
Anglesey ...	Holyhead.
Brecknock ...	—
Cardigan ...	—
Carmarthen ...	Llandovery.
Carnarvon ...	Llandudno.
Denbigh ...	Colwyn Bay.
Flint	Penbedw.
Glamorgan ...	Port Talbot.
Merioneth ...	Aberdovey.
	Dolmelynllyn.
Montgomery ...	Churchstoke.
	Llandinam.
Pembroke ...	St. Ann's Head.
	St. David's.
	Tenby.
Radnor	Disserth.
Islands :—	
Isle of Man ...	Cronkbourne.
Jersey	St. Aubin's.
	St. Heliers.
Guernsey ...	St. Peter Port.
Scotland :—	
Aberdeen ...	Aberdeen.
	Braemar.
	Pennant Bay.
Argyll	Laudale.
	Poltallooh.
Ayr	Ardrossan.
	Ballantrae.
	Pinmore.

County.	Station.
Scotland—*cont.*	
Banff	Cullen.
	Gordon Castle.
Berwick ...	Burnmouth.
	Marchmont
Bute	Lamlash.
	Rothesay.
Caithness ...	Wick.
Clackmannan ...	—
Cromarty ...	Cromarty.
	Strathpeffer Spa.
Dumbarton ...	—
Dumfries ...	—
Edinburgh ...	Edinburgh.
	Leith.
	Rosewell.
Elgin	—
Fife	Burntisland.
Forfar	Dundee.
	Lednathie.
	Uzon.
Haddington ...	—
Inverness ...	Ben Nevis.
	Fort Augustus
	Fort William.
Kincardine ...	Cove Bay.
Kinross	—
Kirkcudbright	Cargen.
	Glenlee.
Lanark	Glasgow.
Linlithgow ...	—
Nairn	Nairn.
Orkney	Deerness.
	Kirkwall.
	Westray.
Peebles	—
Perth	Forgandenny.
	Ochtertyre.
Renfrew ...	—
Ross	Glencarron.
	Stornoway.
Roxburgh ...	Ladylaw.
	Wolfelee.
Selkirk	—
Shetlands ...	Lerwick.
	Sumburgh Head.
	Symbister.
Stirling... ...	—
Sutherland ...	Dunrobin Castle.
	Lairg.
Wigton	Stranraer.
Ireland :—	
Antrim	Portrush.
Armagh ...	Armagh.
Carlow	—
Cavan ...	—
Clare	Ennis.
	Hurdlestown.
	Kilcredane.
	Lahinch.
	Liscanor.

County.	Station.	County.	Station.
Ireland—*cont.*		Ireland—*cont.*	
Clare	Mount Callan.	Kerry	Minard.
	Newmarket-on-Fergus.		Valencia.
			Do. Glanleam.
	Quin.		Do. Knightstown.
	Seafield.	Kildare	—
Cork	Ballydonegan.	Kilkenny ...	Kilkenny.
	Baltimore.	King's Co. ...	Birr Castle.
	Bantry.	Leitrim	Carrigallen,
	Castletown Bere.	Limerick ...	Foynes.
	Castletownshend.		Limerick.
	Crookhaven.		Roxborough.
	Crosshaven.	Londonderry ...	Londonderry,
	Doneraile.	Longford ...	Currygrane.
	Lawrence Cove.	Louth	—
	Roches Point.	Mayo	Ballyglass,
	Schull.		Belmullet.
	Union Hall.		Blacksod Point.
Donegal ...	Malin Head.	Meath	—
	Sheep Haven.	Monaghan ...	—
	Teelin.	Queen's Co. ...	—
Down	Donaghadee.	Roscommon ...	—
Dublin	Dublin (City).	Sligo	Markree Castle.
	Do. (Mountjoy Barracks.)	Tipperary ...	—
	Glasnevin.	Tyrone	Lissan.
	Killiney.		Omagh.
Fermanagh ...	—	Waterford ...	Waterford,
Galway	Arran.	Westmeath ...	—
	Cleggan.	Wexford ...	—
	Spiddal.	Wicklow ...	Bray.
Kerry	Killarney.		Newcastle.

APPENDIX XII.

LIST OF DOCUMENTS received from FOREIGN AND COLONIAL LAND STATIONS during the year ending March 31st, 1899.

Place.	Observer.	Nature of Observations.
Antigua	Francis Watts and K. McDonald ...	Observations twice daily, 1898, March to December; 1899, January, February.
Ascension (Garrison)	... ...	Lighthouse Register, 1898 August to December.
Bahamas (Abaco)	Lightkeepers...	„ „ „ January to December.
„ (Cat Cay)	A. S. Haigh	Barometer diagrams, 1898, March to October.
„ (Cay Lobos)	Lightkeeper	Lighthouse Register, 1898, January to December.
„ (Cay Sal)	„	„ „ „ „ „
„ (Inagua)	„	„ „ „ „ „
„ (Nassau)	J. A. Kerr	Observations once daily, 1898, February to December; 1899, January and February.
„ (Watling Island) ...	Lightkeeper	Lighthouse Register, 1898, January to December.
Barbados	J. R. Bovell	Monthly summary of observations twice daily, 1898, January to December; 1899, January.
Beyrout (Lee Observatory) ...	R. H. West, M.A.	Observations twice daily, 1898, March to September.
Brumana (Mount Lebanon) ...	T. Little	„ „ „ October 1892 to February 1898.
Cape Pembroke (Falkland Islands)	G. K. Broom, Lightkeeper	Lighthouse Register, 1898, January to December.
Cape Spartel (Tangier)	J. J. Emmott, Lloyd's Signalman	Observations twice daily, 1898, March to December; 1899, January, February.
Colon, Isthmus of Panama ...	Rev. S. P. Hendrick	Observations twice daily, 1898, March to December; 1899 January, February.
Cyprus (Famagusta)	G. Eliades	Observations twice daily, 1898, January to December.
„ (Kyrenia)	P. Michaelides	„ „ „ „ „ „
„ (Larnaca)	C. Perini	„ „ „ „ „ „
„ (Limassol)	Luigi Béraud	„ „ „ „ „ „
„ (Nicosia)	P. Nicopoulos	„ „ „ „ „ „
„ (Papho)	E. A. Malliotis and M. Theodorides	„ „ „ „ „ „

George Town (British Guiana)...	Robert Ward...	Observations twice daily, 1898, January to December ; 1899, January.
" " " " ...	" "	Daily record of sunshine, " " " " "
Gibraltar	Sergeant J. Power, Med. Staff Corps.	Observations twice daily, 1898, March to December; 1899, January, February.
Gold Coast (Aburi)	Assistant Colonial Surgeons ...	Observations twice daily, 1898, January to December ; 1899, January.
" " (Accra)	" " " ...	" " " " " " " "
" " (Adda)	" " " ...	" " " " " " " "
" " (Axim)	" " " ...	" " " " " " " "
" " (Cape Coast Castle)	" " " ...	" " " " " " " "
" " (Kwitta)	" " " ...	" " " " " " " "
Havana (R. Colegio de Belen) ...	... ...	Three-hourly observations of clouds, May 1, 1896, to July 31, 1897.
Kambole (Tanganyika)	J. G. Mackay	Observations of rainfall and temperature, 1898, January to March.
Lagos	T. B. Wright	" twice daily, 1898, February to December ; 1899, January.
Las Palmas (San Augustin) ...	... ...	Results of observations for 1893–1896.
Malden Island	... ...	Observations twice daily, February to December 1896.
Mojanga (Madagascar)	S. C. Knott	" " " 1898, January to April.
Namirembe, Mengo, Uganda ...	Rev. A. J. Pike	" once daily, 1898, January.
St. Helena	H. S. Hands and A. L. C. Hands ...	" " " " to December.
"	" " ...	Continuous record of wind (direction and velocity), 1898, January to December.
" (James Town) ...	P. Clifford and A. E. Broadway ...	Daily rainfall, 1898, January to December ; 1899, January.
" (Mount Pleasant) ...	T. C. Barker	" " " " "
Sierra Leone	Z. Grant	Observations twice daily, 1898, March to December ; 1899, January, February.
Sombrero	J. A. Richardson and A. L. Richardson.	Lighthouse Register, 1897, April to December ; 1898, January to September.
Teneriffe (Sitio de Cullen) ...	A. F. Perry	Observations twice daily, 1898, March to December ; 1899, January.
" " " ...	"	Continuous record of pressure, 1898–1899.
" " " ...	"	" " temperature, 1898–1899.

APPENDIX XIII.

ADDITIONS TO THE LIBRARY DURING THE YEAR ENDING 31ST MARCH, 1899.

Aachen, Meteorologische Station.—Deutsches meteorologisches Jahrbuch für 1897. Meteorologische Station I. Ordnung in Aachen. Ergebnisse der meteorologischen Beobachtungen. Herausgegeben . . . von P. Polis. Jahrg. 3. la. 4°. Karlsruhe, 1898.

——— ——— Ergebnisse der 1898 in Aachen von der meteorologischen Station Aachen des Königl. Preuss. Meteorologischen Instituts angestellten Beobachtungen. sm. f°. Sheet.

Adelaide Observatory.—Meteorological observations made at the Adelaide Observatory, and other places in South Australia and the Northern Territory, during the year 1895, under the direction of C. Todd. sm. f°. Adelaide, 1898.

[———] Rainfall in South Australia and the Northern Territory during 1896; with weather characteristics of each month. By Sir C. Todd. f°. Adelaide, 1898.

Aldous, J. C. P.—An elementary course of physics. sm. 8°. London, 1898.

[**Algiers, Service Météorologique du Gouvernement Général de l'Algérie.**]—Bulletin météorologique de l'Algérie. 1898, Jan. 1—Dec. 31. sm f°. Sheets.

[**Allahabad, Meteorological Office.**]—Administration report of the Meteorological Reporter to Government, North-Western Provinces and Oudh, for the year 1897–98. sm. f°. s.l.e.a.

[——— ———] Brief sketch of the meteorology of the North-Western Provinces and Oudh and adjacent parts of Rajputana and the Punjab, for the year 1897. sm. f°. s.l.e.a.

Amsterdam, Kon. Nederlandsch Aardrijkskundig Genootschap. Tijdschrift. Tweede serie. Deel 15. 8°. Leiden, 1898.

* **Angot, A.**—Traité élémentaire de météorologie. la. 8°. Paris, 1899.

Archibald, [E.] D.—Weather types in relation to long-period forecasting. 8°. London, 1898.

Azambuja, G. A. de.—Annuario do Estado do Rio Grande do Sul. 1899 Anno 15. sm. 8°. Porto Alegre, 1898.

* **Banfield, F.**—Weather-making. la 8°. (*Cassell's Mag.*, 1899, *Jan.*, *p.* 231.)

[**Bangalore, Mysore Government, Meteorological Department.**]—Meteorology in Mysore for 1897, being the results of observations at Bangalore, Mysore, Hassan and Chitaldrug, by John Cook. la. 4°. Bangalore, 1898.

——— ——— ——— Report on rainfall registration in Mysore for 1895–97. By J. Cook. 3 vols. la 4°. Bangalore, 1896–98.

‖ **Baracchi, P.**—Cloud observations in Victoria. 8°. (*Austral. Assoc. Advanc. Sc.*, 7, 1898.)

Barcelona, Granja Experimental de Barcelona.—Observaciones meteorológicas. 1896, Dec.—1898, Dec. la. 8°. Barcelona, s a.

NOTE.—Books marked * have been acquired by purchase; the others are donations from institutions, societies, or authors. Those marked ‖ are excerpt papers, extra copies of which have been separately printed.

In some cases additional publications have been received besides those specified, but only completed volumes or years are given here.

Barcelona, Granja Experimental de Barcelona.—Resumen de las observaciones meteorológicas y fenológicas. 1896, Dec.-April, 1898. la. 8°. Barcelona, s.a.

——— ——— Red meteorológica de Cataluña y Baleares. 1898, May-Dec. la 8°. Barcelona, s.a.

Bathurst, Gambia.—Comparative rainfall, colony of the Gambia, 1894–1898 and meteorological observations, 1898. sm. f°. Sheet.

* **Bebber, W. J. van.**—Die Wettervorhersage. Eine gemeinverständliche praktische Anleitung zur Wettervorhersage auf Grundlage der Zeitungs-Wetter-Karten und Zeitungs-Wetterberichte für alle Berufsarten. Zweite verbesserte und vermehrte Auflage. la 8°. Stuttgart, 1898.

* **Begg, J. S.**—Snowed up in June! An interesting account of the observatory on the summit of Ben Nevis, . . . la 8°. (*Pearson's Mag.*, 6, 1898, *Sept.*, *p.* 242.)

Belize, St. Joseph's Observatory.—Summary of meteorological observations, 1898, Jan.-Dec. 4°. Sheets. (*The Angelus, Belize*, 1898-99.)

Ben Nevis.—Meteorological observations on Ben Nevis. Report of the Committee. . . . Drawn up by Dr. Buchan. 1893–1897. 5 papers. 8°. (*Rep. Brit. Assoc. Adv. Sc.*, 1894–1898.)

‖ ——— Reports of the Committee . . . appointed for the purpose of co-operating with the Scottish Meteorological Society in making meteorological observations on Ben Nevis. 1889, 1891. 2 parts. 8°. (*Rep. Brit. Assoc. Adv. Sc.*, 1890–1892.)

Berlin.—Verhandlungen der Konferenz der Vorstände Deutscher Meteorologischer Centralstellen zu Berlin vom 13. bis 17. Oktober, 1897. la 8°. Berlin, 1897.

——— **Hydrographisches Amt der Admiralität.**—Segel-Handbuch für die Nordsee. 1. Heft. Meteorologische und klimatologische Verhältnisse, magnetische Elemente, physikalische und Strömungs-Verhältnisse des Nordseegebiets. la 8°. Berlin, 1883.

——— **Königlich Meteorologisches Institut.**—Die Feier des fünfzigjährigen Bestehens des Königlichen Meteorologischen Instituts am 16. Oktober 1897. 4°. Berlin, 1898.

——— **Königlich Preussisches Meteorologisches Institut.**—Bericht über die Thätigkeit . . . im Jahre 1897 von W. von Bezold. la 8°. Berlin, 1898.

——— ——— Ergebnisse der Gewitter-Beobachtungen in den Jahren 1895 und 1896. la 4°. Berlin, 1898.

——— ——— Ergebnisse der meteorologischen Beobachtungen in Potsdam. 1896. la 4°. Berlin, 1898.

‖ ——— ——— Witterung nach den Beobachtungen des königlichen meteorologischen Instituts. 1898, Jan.-Dec. la 4°. (*Statist. Korresp.*)

——— **Reichs-Marine-Amt.**—Segel-Handbuch für die Ostsee. 1. Abtheilung Meteorologie, Klimatologie und physikalische Verhältnisse des Ostseegebiets. Bearbeitet von der Seewarte. Zweite Auflage. la 8°. Berlin, 1891.

——— ——— Segel-Handbuch für die Küste von Deutsch-Ostafrika und die Insel Zanzibar. la 8°. Berlin, 1895.

Bermuda, Registrar General's Office.—Report of the Registrar General for the year 1897. sm. f°. s.l.e.a.

Berne, Eidgenössisches Oberbauinspectorat, Hydrometrisches Bureau.—Graphische Darstellung der schweizerischen hydrometrischen Beobachtungen sowie der Lufttemperaturen und Niederschlags-höhen für das Jahr 1897. la f°. Sheets.

In the French language also.

Birmingham, Observatory of the Birmingham and Midland Institute.—Records of meteorological observations taken at the Observatory of the Birmingham and Midland Institute. By A. Cresswell, 1897, 1898. 2 vols. 8°. (*Proc. Birmingham Nat. Hist. Soc. xi., and Proc. Birmingham and Midland Inst. Sc. Soc.*)

‖ **Bjerknes, V.**—Ueber einen hydrodynamischen Fundamentalsatz und seine Anwendung besonders auf die Mechanik der Atmosphäre und des Weltmeeres. la 4°. Stockholm, 1898. (*K. Svensk. Vetensk. Akad. Handl.*, 31, *No.* 4.)

‖ **Black, W. G.**—On meteorology at the seaside. Read at the congress of the Institute held at Worcester, Sept. 27th, 1889. 8°. (*Trans. San. Inst.*, 10.)

Bolton.—Annual report of the Museums and Meteorological Observatory for 1898. 8°. Bolton, s.a.

Bombay, Government Observatory.—Report on the condition and proceedings of the Government Observatory, Colába, for the year 1896–97. f°. (Bombay), s.a.

[—— **Meteorological Office.**]—Brief sketch of the meteorology of the Bombay Presidency in 1897–98. f°. s.l.e.a.

Borghini, N.—Il fulmine. Modificazioni scientificopratiche sulla costruzione e collocazione dei parafulmini. 3ª ed. Corredata da incisioni. sm. 8°. Arezzo, 1899.

‖ **Börnstein, R., und Less, E.**—Die Temperaturverhältnisse von Berlin. sm. f°. (*Meteor. Zeitschr.*, 1898, *Sept.*, *p.* 321.)

* **Boyer, J.**—La photographie et l'étude des nuages. sm. 8°. Paris, 1898.

Bremen, Meteorologische Station I. Ordnung. — Deutsches meteorologisches Jahrbuch. Ergebnisse der meteorologische Beobachtungen. Herausgegeben von P. Bergholz. Jahrg. 8, 1897. la 4°. Bremen, 1898.

Brisbane, Post and Telegraph Department, Meteorological Branch.—Brisbane Observatory, Wickham Terrace. Meteorological synopsis. 1897, Jan.–Dec. f°. Sheets. (*Suppl. Queensland Gov. Gazette.*)

——— ——— ——— Table of rainfall. 1896, Jan.–Dec. f°. Sheets.

* **British Almanac, The,** and Family Cyclopœdia. 1899. 72nd year of issue. sm. 8°. London, s.a.

British New Guinea.—Annual reports on British New Guinea. 1892–93—1894–95; 1896–97. 4 vols. sm. f°. Brisbane, 1894–98.

Brown, W. P.—The Glyder thermometers and winter temperature on mountain summits. la. 8°. (*Climbers' Club Journ.*, *i.*, 1899, *No.* 3, *p.* 80.)

Brussels, Observatoire Royal.—Bulletin météorologique. 1898, Jan. 1–Dec. 31. f°. Sheets.

‖ **Buchan, [A.]**—The mean atmospheric pressure and temperature of the British Islands. la. 8°. (*Journ. Scott. Met. Soc.*, *3rd ser.*, 11, 1898.)

Bucharest, Institutul Meteorologic al Romaniei.—Analele . . . de S. C. Hepites. Tom. 12, 1896. la. 4°. Bucuresti, 1898.

In the French language also.

——— ——— Buletin meteorologic. Anul 4, 1898. Jan. 1–Dec. 31. la. 4°. Sheets.

——— ——— Buletinul observatiunilor meteorologice din Romania de S. C. Hepites. Anul 6, 1897. sm. f°. Bucuresci, 1898.

Buck, R. C.—A manual of algebra. sm. 8°. London, 1898.

Budapest, Magyar Kir. Országos Meteor. Intézet.—Meteorologiai feljegyzesek. 1897, 1898. Jan.–Dec. and year. oblong la. 8°. Sheets.

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APPENDIX XIV.

ACCOUNT of RECEIPTS and PAYMENTS for the year ending 31st March, 1899:—

RECEIPTS.	£	s.	d.	PAYMENTS.	£	s.	d.	£	s.	d.
Balance from year 1897–98	1,755	9	2	ADMINISTRATION:						
Parliamentary Vote ...	15,300	0	0	Council...	990	0	0			
Repayment of expenses charged under—				Secretary	800	0	0			
				Salaries and wages ...	930	0	0			
				Rent, fuel, and lighting	717	19	1			
				Incidental and contingent expenses ...	191	3	3			
				Furniture and fittings	82	16	9			
(1.) Incidental expenses ... £ 9 14 8				Expenses incidental to International Meteorological Congress	4	3	10			
(2.) Observatories ... 25 8 2				Pensions	144	0	0			
	35	2	10					3,860	2	11
SPECIAL RESEARCHES:				SPECIAL RESEARCHES:						
Grant for investigation on Atmospheric Electricity	200	0	0	Salaries and other charges	683	19	8			
				Investigation on Atmospheric Electricity	102	8	9			
								786	8	5
SUPPLY OF INFORMATION:				LAND METEOROLOGY:						
Daily Weather Charts and Forecasts ... 284 4 2				Observatories and stations, including remuneration of observers	2,291	12	1			
6 p.m. Charts ... 25 0 0				Salaries :—Discussion and reduction of observations, &c. ...	1,332	14	10			
Reports for Press Agencies, &c. 89 1 2								3,624	6	11
Telegrams sent abroad... ... 549 16 3				WEATHER INFORMATION AND FORECASTS:						
	948	1	7	Telegraphic reports and storm warnings, remuneration of observers, &c.	2,736	10	5			
SALE OF INSTRUMENTS, &C.:				Salaries :—Preparation and issue of reports and forecasts ...	1,901	0	7			
Royal Navy account ... 16 16 0								4,637	11	0
Mercantile Marine account ... 39 2 6				INSPECTIONS:						
"M.O." (Stations) account 32 10 3				Salaries and travelling expenses	...			431	17	4
	88	8	9	OCEAN METEOROLOGY:						
Repayment of miscellaneous Commissions executed for Colonial and Foreign institutions, &c.	207	4	0	Salaries :—Discussion and reduction of observations ...	1,414	14	10			
Commission charged on work done for Colonies, &c. ...	17	17	4	Expenses incidental to the supply of instruments :—						
				Proportion for care and issue of instruments ...	403	6	8			
				Royal Navy ...	529	9	7			
				Mercantile Marine	321	2	7			
				Distant island and coast stations ...	9	5	0			
								2,677	18	8
				Miscellaneous commissions executed for Colonial and Foreign institutions, &c. ...	...			266	2	10
				BALANCE:						
				Cash at Bank ...	2,203	15	0			
				„ at Office	64	0	7			
								2,267	15	7
£	18,552	3	8				£	18,552	3	8

In the year 1898-99 the sum of £1,731 0s. 5d. was paid to the Post Office on account of inland and foreign

APPENDIX XV.

List of the Principal Papers printed in various Reports Issued by the Office from the Year 1866.

I.—Daily Weather Report.

Year.	Page.	—
1896 (July to Dec.).	1	Mean Values of Barometric Pressure for each Month and for the Whole Year, derived from Observations made at 8 a.m. daily during the 25 Years 1871–95.
1896	2 and 3	Mean Values of the Dry Bulb and Wet Bulb Temperatures for ditto, ditto.
„	4 and 5	Mean Values of the Daily Maximum and Minimum Temperatures, and of the Maximum and Minimum combined, for the 25 Years 1871–95.
„	6 and 7	Extremes of the Daily Maximum and Minimum Temperatures for ditto, ditto.
„	8	Mean Rainfall for each Month and for the Whole Year—derived from Observations extending over the 30 Years 1866–95.
„	9	Mean Numbers of Hours of Bright Sunshine, with the Percentages of Possible Duration, derived from Observations extending over the 15 Years 1881–95.

II.—Weekly Weather Report.

Year.	Page.	—
1884	V.	Table A.—Showing for each Degree of Latitude, from 49° N. to 58° N. the Total Number of Hours during which the Sun is above the Horizon, in each Month of the Four Quarters of the Year.
„	VI.	Table B.—Showing similar information for each Week of the Year.
1895	VI.–VII.	Mean Values of the Daily Maximum and Minimum Temperatures, and of the Maximum and Minimum combined, for each Month and for the Whole Year, derived from Observations extending over the 25 Years 1871–95.
„	VIII.	Mean Rainfall for each Month and for the Whole Year, derived from Observations extending over the 30 Years 1866–95.

Year.	Page.	—
1895	IX.	Mean Numbers of Hours of Bright Sunshine, together with the Per-centages of the Possible Duration, for each Month and the Whole Year, derived from Records extending over the 15 Years 1881–95.
„	[17]	Table I.—Showing for each District, during each of the Three Lustra, and the whole Period comprehended in the 15 Years 1881–95, the Mean Aggregate numbers of rainy days from the beginning of the Year to the end of each week in the Year.
„	[23]	Table II.—Showing in the same detail the Mean Aggregate Amounts of Rainfall.
„	[27]	Table III.—Showing in the same detail the Mean Aggregate Values for Accumulated Heat above 42° F.
„	[32]	Table IV.—Showing in the same detail the Mean Aggregate Values for Accumulated Heat below 42° F.
„	[37]	Table V.—Showing in the same detail the Mean Aggregate Numbers of Hours of Bright Sunshine.
„	[42]	Table VI.—Showing in the same detail the Mean Per-centages of the possible amount of Bright Sunshine.
„	[47]	Table showing in Degrees Fahrenheit for each District, during each of the Three Lustra, and for the whole Period comprehended in the 15 Years 1881–95, the Mean Temperature of the Air, for each week in the Year.
1898	[1-9]	Summaries of Rainfall and Mean Temperature for the First, Second, Third, and Fourth Quarters, and for the Whole Year, during the 33 Years 1866–98. [The separate Yearly Values for 1866-85 are contained in the Reports for 1890, and previous Years.]

III.—Monthly Weather Report.

Year.	Page.	—
1884	[iii.]	Table showing for each Month and for each Degree of Latitude from 18° N. to 49° N. the Total Number of Hours during which the Sun is above the Horizon.
„	[i.]	On London Rain. By W. J. Russell, Ph.D., F.R.S.
„	[ii.]	On the Amount of Carbonic Acid in London Air. By W. J. Russell, Ph.D., F.R.S.
1885	[i.]	On the Impurities in London Air. By W. J. Russell, Ph.D., F.R.S.
„	[ii.]	Table showing the Mean Monthly and Annual Rainfall at the Weekly and Monthly Weather Report Stations for the 20 Years 1866 to 1885.

IV.—Quarterly Weather Report.

Year.	Page.	——
1869	43	Factors for Calculation of Gradients.
„	[1]	Notes on Easterly Gales, by R. H. Scott.
1870	iii.	Description of Observatories, with illustrations of thermometer screens.
„	[23]	Bessel's Paper on the Determination of the Law of a Periodical Phenomenon. Translated from the Astronomische Nachrichten, 136, for May, 1828.
1871	[7]	Discussion of Anemometrical Results for Orkney, 1863–68.
„	[59]	Constants for the Determination of the Monthly March of Atmospherical Pressure, &c. at the Seven Observatories for 1869–70.
1872	[13]	Discussion of the Anemometrical Results at Bermuda from 1st April 1859 to 31st March 1863.
1873	[13]	Rainfall of the London District for Sixty Years, 1813–72. By G. Dines, F.M.S. [with diagram].
1874	[26]	On the Winds at Liverpool. By W. W. Rundell.
1875	[1]	Observations taken at Nine Stations of the Second Order [1875].
„	[89]	Mean Monthly Results for the Seven Observatories for the Lustrum, 1871–75.
1876	[13]	Report on the Reduction of Greenwich Curves for 1875 to a Common Standard with those of Kew [with 25 plates].
„	[20]	Results of Observations made at the Pagoda, Kew Gardens, to Determine the Influence of Height on Temperature, &c. By R. H. Scott, F.R.S. [4 plates.]
„	[39]	Comparison of Results obtained by means of the Harmonic Analyser, with similar Results got from Measurement and Numerical Calculation for the Seven Observatories.
1877	[13]	On the Diurnal Range of Rainfall at the Seven Observatories in connexion with the Meteorological Office, 1871–80. By R. H. Scott, F.R.S. [5 plates.]
„	[35]	Report on Evaporimeters. By W. N. Shaw, M.A. [2 plates.]
1878	[13]	On the Computation of the Quantity of Heat in excess of any Fixed Base Temperature, received at any place during the course of the Year, &c. By Lieut.-Gen. Strachey, R.E., F.R.S.
1879	[41]	Report on Hygrometric Methods, &c. Part I. By W. N. Shaw, M.A.
1880	[13]	Report on Experiments made at the Kew Observatory with Thermometer Screens of different patterns during 1879, 1880 and 1881. By G. M. Whipple, Superintendent.
„	[19]	Tables and Diagrams illustrating the Diurnal Range of Barometric Pressure in the British Isles during the Years 1876–80. By F. C. Bayard, LL.M., F.R. Met. Soc. [5 plates.]

V.—Report of the Meteorological Committee of the Royal Society.

Year.	Page.	——
1867	27	A Description of the Self-recording Instruments recently erected by the Meteorological Committee of the Royal Society in various parts of the United Kingdom [with plates].
1869	25	Note upon a Self-registering Thermometer adapted to Deep-Sea Soundings, by W. A. Miller, M.D., Treasurer and V.P.R.S., extracted from Proceedings of Royal Society, vol. XVII., p. 482.

Year.	Page.	——
1869	36	Description of a Self-recording Rain-gauge, invented by Robert Beckley, of the Kew Observatory; made by James Hicks, London.
1870	25	Description of the Process by which the Traces of the Self-registering Instruments are reduced suitably for publication.
1872	27	A Summary of the Results obtained from the Discussion of the Information for Square 3, being the Region of the Doldrums in the Atlantic. By Capt. H. Toynbee, Marine Superintendent.
1874	33	The International Maritime Conference.

VA.—REPORT of the METEOROLOGICAL COUNCIL.

Year.	Page.	——
1877–78	21	Account of the Experiments on Atmospheric Electricity conducted at Kew Observatory. By Prof. J. D. Everett.
1879–80	28	On the Effect of Sluggishness on the Readings of Marine Barometers on Shore, by Prof. Stokes.
„	43	On the Methods available for the Determination of the Humidity of the Atmosphere, by Mr. W. N. Shaw.
„	46	Memorandum as to the Employment of the Harmonic Analyser in the Meteorological Office, by Prof. Stokes.
1880–81	25	On the Working of the Harmonic Analyser. [Prof. Stokes.]
„	27	Report on Fogs. [W. J. Russell.]
„	28	„ „ Hygrometers and Evaporimeters, presented to the Meteorological Council, May 10, 1881. [W. N. Shaw.]
1881–82	25	On fogs. [W. J. Russell.]
„	29	Report on the Results of a Tentative Reduction of a Year's Electrograms at the Kew Observatory. [G. M. Whipple.]
1882–83	27	On the Results obtained by the use of the Harmonic Analyser.
1884–85	22	Note on Work done with the Harmonic Analyser.
1885–86	22	Memorandum on Cloud Photography, by Prof. Stokes, F.R.S.
1886–87	21	On the Distribution of Gales round the Coasts of the British Isles [for the 15 years, 1871–85].
1887–88	22	On the History of the Severe Storms which visited the British Isles between August 1, 1882, and September 3, 1883, as traceable from the Atlantic Charts published by the Office. By Robert H. Scott, F R.S., Secretary.
„	30	Abstract of Report on Hygrometric Methods, by W. N. Shaw, M.A., reprinted from the "Proceedings of the Royal Society," No. 262.
1888–89	22	Notes of some Results of an Examination of Atlantic Charts published by the Office, by R. H. Scott, F.R.S., Secretary.
„	27	Memorandum on the Measurement of Squalls shown on the Traces yielded by Robinson Anemometers of the "Standard" Pattern, by R. H. Curtis.
1889–90	24	Code of Regulations, &c. for conducting the work at the First Class Observatories, and the Examination thereof. [*See* also Report, 1868.]
„	36	Note on Experiments on Pressure of Wind made by Mr. W. H. Dines.
„	46	Experiments with Violle's Actinometer Apparatus.
„	47	On the Work done with the Harmonic Analyser at the Meteorological Office.

Year.	Page.	—
1890–91	22	On Mr. Dines' Anemometer Experiments.
1891–92	23	On Anemometer Comparisons carried out by the aid of a Grant from the Meteorological Council, by W. H. Dines, B.A.
1892–93	21	On the Construction of the Anemometer recently erected for trial on the roof of the Meteorological Office, by W. H. Dines, B.A.
„	27	On the Harmonic Analysis of Hourly Observations of Air Temperatures at British Observatories, by Lieut.-Gen. R. Strachey, F.R.S.
1894–95	27	Report on the Comparisons made between two Pressure Tube Anemometers on the roof of the Meteorological Office, by Mr. R. H. Curtis.
1895–96	24	Note on Anemometer Experiments, by Mr. R. H. Curtis.
1897–98	21	Report upon Anemometer Experiments at Holyhead, by Mr. R. H. Curtis.
„	28	Description of the Bridled Anemometer designed by Sir G. G. Stokes, Bart., F.R.S., by Mr. R. H. Curtis.

VI.—Hourly Readings of the Self-Recording Instruments of the Observatories in connexion with the Meteorological Office.

Year.	Page.	—
1883	[1]	Constants of formulæ expressing the mean daily range of temperature obtained by the use of the Harmonic Analyser.
1884	[1]	Tables and formulæ to facilitate the computation of harmonic coefficients. By Lieut.-General Strachey, R.E.

VII.—Hourly Means of the Readings obtained from the Self-Recording Instruments at the Five Observatories under the Meteorological Council.

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1891	[1]	Tables of Hourly Sunshine Values, with Plates, for the Ten Years 1881–90, for Seven Observatories.

VIII.—Meteorological Observations at Stations of the Second Order.

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1891	[186]	Results of Observations at Stations of the Second Order for the Fifteen years, 1876–90.

APPENDIX XVI.

LIST OF PUBLICATIONS issued under the Authority of the Meteorological Council.

OFFICIAL.

No. 1. Report of the Meteorological Committee for 1867. 1*s.*
2. Instructions for Meteorological Telegraphy. New Edition, 1891. Prepared for the use of observers exclusively.
3. Fishery Barometer Manual. (New edition, 1887.) 6*d.*
4. Charts showing the Surface Temperature of the South Atlantic Ocean in each Month of the Year. 2*s.* 6*d.*
5. Report of the Meteorological Committee for 1868. 5*d.*
6. Report of the Meteorological Committee for 1869. 10*d.*
7. Quarterly Weather Report for 1869.—Parts I. to IV. 5*s.* eacn.
8. Barometer Manual. (Out of print. See Nos. 3, 24, 40, 60, and 61.)
9. Quarterly Weather Report for 1870.—Parts I. to IV. 5*s.* each.
10. Report of the Meteorological Committee for 1870. 10*d.*
11. Contributions to our Knowledge of the Meteorology of Cape Horn and the West Coast of South America. 2*s.* 6*d.*
12. Currents and Surface Temperature of the North Atlantic Ocean, from the Equator to Lat. 40° N., for each month of the year, with a General Current Chart. 2*s.* 6*d.*
13. A Discussion of the Meteorology of that Part of the Atlantic lying North of 30° N., for the Eleven Days ending 8th February, 1870. With Book of Charts, 5*s.*
14. Quarterly Weather Report for 1871.—Parts I. to IV. 5*s.* each.
15. Report of the Meteorological Committee for 1871. 10*d.*
16. Quarterly Weather Report for 1872.—Parts I. to IV. 5*s.* each.
17. Report of the Meteorological Committee for 1872. 1*s.*
18. Contributions to our Knowledge of the Meteorology of the Antarctic Regions. 2*s.*
19. Quarterly Weather Report for 1873.—Parts I. to IV. 5*s.* each.
20. Charts of Meteorological Data for Square 3. Lat. 0°—10° N., Long. 20°—30° W., and remarks to accompany the Monthly Charts, which show the Best Routes across the Equator for each Month, &c. 20*s.*
21. Report of the Proceedings of the Meteorological Congress at Vienna. 1873. 1*s.*
22. Report of the Meteorological Committee for 1873. 4*d.*
23. Report of the Proceedings of the Conference on Maritime Meteorology held in London, 1874. 2*s.*

24. Instructions in the Use of Meteorological Instruments. [Reprinted 1892.] (New edition in course of preparation.) 2*s*. 6*d*.
25. Quarterly Weather Report for 1874.—Parts I., II., and IV., 5*s*. each. Part III., 5*s*. 9*d*.
26. Report of the Meteorological Committee for 1874. 6*d*.
27. Charts of Meteorological Data for the Nine 10° Squares of the Atlantic which lie between 20° N. and 10° S., and extend from 10° to 40° W., with accompanying Remarks, ending with the Best Routes across the Equator. 24*s*.
28. Contribution to the Meteorology of Japan. By Staff-Commander Thomas H. Tizard, H.M.S. *Challenger*. 1*s*.
29. Report of the Meteorological Committee for 1875. 4*d*.
30. Quarterly Weather Report for 1875.—Parts I.—IV. 5*s*. each.
31. Report of the Meteorological Committee for 1876-7. 3*s*. 5*d*.
32. The Meteorology of the North Atlantic during August, 1873, with 31 Synoptic Charts. With Book of Charts. 15*s*.
33. Quarterly Weather Report for 1876 (New Series).—Part I., 6*s*.; Parts II., III., and IV., 5*s*. each.

*33A. Meteorological Observations at Stations of the Second Order for the year 1876.

33B. Meteorological Observations at Stations of the Second Order for the year 1877.

34. Contributions to our Knowledge of the Meteorology of the Arctic Regions.—Vol. I.: Part I., 2*s*.; Part II., 10*s*.; Part III., 6*s*.; Part IV., 5*s*.; Part V., 6*s*.
35. Report of the Meteorological Council for 1877-8. 1*s*.
36. Report of the Proceedings of the Second International Meteorological Congress at Rome, 1879. 1*s*. 6*d*.
37. Report on the Meteorology of Kerguelen Island. By Rev. S. J. Perry, S.J., F.R.S. 3*s*.
38. Report of the Meteorological Council for 1878-9. 5*d*.
39. Meteorological Observations at Stations of the Second Order for the year 1878. 20*s*.
40. Aids to the Study and Forecast of Weather, by W. Clement Ley, M.A. 1*s*.
41. Report of the Meteorological Council for 1879-80. 1*s*.
42. Report of the Meteorological Council for 1880-81. 1*s*. 2*d*.
43. Meteorological Charts for the Ocean District adjacent to the Cape of Good Hope, with accompanying Remarks. Charts, 25*s*.; Remarks, 7*s*.
44. Report on the Gales experienced in the Ocean District adjacent to the Cape of Good Hope, between Lat. 30° and 50° S., and Long 10° and 40° E., by Capt. H. Toynbee, F.R.A.S. 7*s*. 6*d*.
45. Meteorological Observations at Stations of the Second Order for the year 1879. 20*s*.
46. Report on the Storm of October 13-14, 1881. By Robert H. Scott, F.R.S. 1*s*. 6*d*.
47. Rainfall Tables of the British Isles for 1866-80. Compiled by G. J. Symons, F.R.S. 7*s*. 6*d*.

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* The Observations at Stations of the Second Order for the years 1873–1875 will be found in the Quarterly Weather Reports for the respective years.

LIST OF PUBLICATIONS—*continued.*

48. Report of the Meteorological Council for 1881-2. 1*s.*
49. Quarterly Weather Report for 1879. (New Series.) Parts I., II., and III., 6*s.* each; Part IV., 5*s.* 6*d.* Appendices and Plates. 27*s.*
50. Quarterly Weather Report for 1880. (New Series.) Parts I. and II., 6*s.* each; Part III., 4*s.*; Part IV., 6*s.* Appendices and Plates. 28*s.*
51.* Hourly Readings from the Self-Recording Instruments at the Seven Observatories under the Meteorological Council, 1881. (New Series.) Part I., 10*s.* 6*d.* Parts II., III., and IV., 21*s.* each.
52. Quarterly Weather Report for 1877. (New Series.) Part I., 10*s.*; Part II., 5*s.*; Part III., 4*s.* 6*d.*; Part IV., 6*s.* Appendices and Plates. 27*s.*
53. Meteorological Atlas of the British Isles. 5*s.* 6*d.*
54. Hourly Readings from the Self-Recording Instruments at the Seven Observatories under the Meteorological Council, 1882. Parts I. and II., 20*s.* each; Part III., 22*s.* 6*d.*; Part IV., 26*s.*
55. Quarterly Weather Report for 1878. (New Series.) Parts I., II., III., and IV., 6*s* each. Appendices and Plates, 28*s.*
56. Sunshine Records of the United Kingdom for 1881. 4*s.*
57. Meteorological Observations at Stations of the Second Order for the year 1880. 34*s.* 6*d.*
58. Report of the Meteorological Council for 1882-3. 10½*d.*
59. Charts showing the Surface Temperature of the Atlantic, Indian, and Pacific Oceans. 21*s.*
60. Principles of Forecasting by means of Weather Charts. By the Hon. Ralph Abercromby, F.R.Met.Soc. (Second edition, revised.) [Out of Print.]
61. A Barometer Manual for the Use of Seamen. With an Appendix on the Thermometer, Hygrometer, and Hydrometer. (Third Edition.) 6*d.* [A new Edition in the Press.]
62. Monthly Weather Reports for 1884. Jan., Feb., March, May—Nov., 1*s.* 6*d* each. April (with 2 Appendices), 2*s.* 6*d.* Dec., 1*s.* 9*d.*
63. Hourly Readings from the Self-Recording Instruments at the Seven Observatories under the Meteorological Council, 1883. Parts I., II., and III., 21*s.* each; Part IV., 30*s.*
64. Report of the Meteorological Council for 1883-4. 1*s.* 2*d.*
65. Monthly Weather Reports for 1885. Jan. to Dec., 1*s.* 6*d.* each.
66. Meteorological Observations at Stations of the Second Order for the year 1881. 35*s.*
67. Report of the Meteorological Council for 1884-5. 4*s.* 4*d.*
68. Monthly Weather Reports for 1886. Jan. to Dec., 1*s.* 6*d.* each.
69. Meteorological Observations at Stations of the Second Order for the year 1882. 35*s.*

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* For the years 1874–1880 the Hourly Readings were issued in lithographed form. Price 20*s.* per annum.

70. **Hourly Readings from the Self-Recording Instruments at the Four Observatories under the Meteorological Council. 1884. Part I., 12*s.*; Part II., 10*s.*; Part III., 10*s.* 6*d.*; Part IV., 15*s.***
71. **Synchronous Weather Charts of the North Atlantic and the adjacent Continents. Aug. 1, 1882, to Sept. 3, 1883. Parts I. to IV. (33 sheets each.) 17*s.* each part.**
72. **Report of the Meteorological Council for 1885-86. 8*d.***
73. **Meteorological Observations at Stations of the Second Order for the year 1883. 30*s.***
74. **Hourly Readings from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1885. Parts I. and II., 11*s.* each; Part III., 10*s.* 6*d.* Part IV., 12*s.***
75. **Report of the Meteorological Council for 1886-87. 8*d.***
76. **Charts showing the Mean Barometric Pressure over the Atlantic, Indian, and Pacific Oceans. 10*s.* 6*d.* Supplementary Chart, 6*d.***
*77. **Monthly Weather Reports for 1887. January to April, 1*s.* 6*d.* each. May to December, in wrapper, 12*s.***
78. **Meteorological Observations at Stations of the Second Order for the year 1884. 32*s.***
79. **Report of the Meteorological Council for 1887-88. 1*s.***
80. **Daily Weather Charts for the period of six weeks ending June 25, 1885, to illustrate the tracks of two cyclones in the Arabian Sea. 10*s.***
81. **Hourly Readings from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1886. Parts I., II., and III., 10*s.* 6*d.* each. Part IV., 12*s.* 6*d.***
82. **Meteorological Observations at Stations of the Second Order for the year 1885. 31*s.***
83. **Meteorological Observations at the Foreign and Colonial Stations of the Royal Engineers and the Army Medical Department. 1852-1886. 23*s.***
84. **Report of the Meteorological Council for 1888-89. 5½*d.***
†85. **Weekly Weather Report for the year 1888. Vol. 5. Second Series. 4*d.* per week. With Appendices and Monthly Supplements, priced separately. Annual subscription, including Supplements and Appendices, post paid, 21*s.* 2*d.***
86. **Weekly Weather Report for the year 1889. Vol. VI. Second Series. 6*d.* per week. With Appendices and Monthly Supplements, priced separately. Annual subscription, including Supplements and Appendices, post paid, 30*s.***
87. **Weekly Weather Report for the year 1890. Vol. VII. Third Series. (For Price, &c., see No. 86.)**
88. **Meteorological Observations at Stations of the Second Order for the year 1886. 25*s.***

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* Publication continued after this year as a Supplement to the Weekly Weather Report.

† The publication of the Weekly Weather Report began in February 1878 Annual Subscription, 1878–1883, 12*s.* 6*d.*; 1884–1887, 21*s.* 2*d.*

LIST OF PUBLICATIONS—*continued.*

89. Meteorological Observations made at Sanchez, Samaná Bay, St. Domingo. 1886-88. By the late W. Reid, M.D. 8*s.* 6*d.*
90. Cyclone Tracks in the South Indian Ocean. From information compiled by Dr. Meldrum, C.M.G., F.R.S. 7*s.*
91. Report of the Meteorological Council for 1889-90. 7½*d.*
92. Meteorological Charts of the portion of the Indian Ocean adjacent to Cape Guardafui and Ras Hafún. 6*s.*
93. Harmonic Analysis of Hourly Observations of Air Temperature and of Pressure at British Observatories. 12*s.*
94. Hourly Means of the Readings obtained from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1887. 16*s.*
95. Meteorological Observations at Stations of the Second Order for the year 1887. 24*s.*
96. Weekly Weather Report for the year 1891. Vol. VIII., Third Series. (For Price, &c., see No. 86.)
97. Hourly Means of the Readings obtained from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1888. 20*s.*
98. Ten Years Sunshine in the British Isles, 1881-90. 2*s.*
99. Report of the Meteorological Council for 1890-91. 5½*d.*
100. Weekly Weather Report for the year 1892. Vol. IX., Third Series. (For price, &c., see No. 86.)
101. Meteorological Observations at Stations of the Second Order for the year 1888. 22*s.*
102. Report of the International Meteorological Conference at Munich in 1891. 1*s.* 6*d.*
103. Hourly Means of the Readings obtained from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1889. 15*s.*
104. Report of the Meteorological Council for 1891-92. 6*d.*
105. Hourly Means of the Readings obtained from the Self-Recording Instruments at the Four Observatories under the Meteorological Council, 1890. 20*s.*
106. Meteorological Charts of the Red Sea. 21*s.*
107. Weekly Weather Report for the year 1893. Vol. X., Third Series. (For Price, &c., see No. 86.)
108. Meteorological Observations at Stations of the Second Order for the year 1889. 34*s.*
109. Report of the Meteorological Council for 1892-93. 8*d.*
110. Meteorological Observations at Stations of the Second Order for the year 1890. 34*s.*
111. Weekly Weather Report for the year 1894. Vol. XI., Third Series. (For Price, &c., see No. 86.)
112. Report of the Meteorological Council for 1893-94. 7½*d.*
113. Hourly Means of the Readings obtained from the Self-Recording Instruments at the Five Observatories under the Meteorological Council, 1891. 32*s.* 6*d.*
114. Rainfall Tables of the British Isles, 1866-90. 6*s.*
115. Report of the International Meteorological Committee, Upsala, 1894. 1*s.*
116. Weekly Weather Report for the year 1895. Vol. XII., Third Series. (For Price, &c., see No. 86.)

117. Meteorological Observations at Stations of the Second Order for the year 1891. 30*s*.
118. Hourly Means of the Readings obtained from the Self-Recording Instruments at the Five Observatories under the Meteorological Council, 1892. 21*s*.
119. Report of the Meteorological Council for 1894-95. 8½*d*.
120. Meteorological Observations at Stations of the Second Order for the year 1892. 27*s*.
121. Weekly Weather Report for the year 1896. Vol. XIII. Third Series. (For Price, &c., see No. 86.)
122. Report of the Meteorological Council for 1895-96. 8½*d*.
123. Meteorological Charts of the Southern Ocean between the Cape of Good Hope and New Zealand. 12*s*.
124. Monthly Current Charts for the Indian Ocean, from Information collated and prepared in the Meteorological Office. Published by the Admiralty. 7*s*.
125. Meteorological Observations at Stations of the Second Order for the year 1893. 27*s*.
126. Hourly Means of the Readings obtained from the Self-Recording Instruments at the Five Observatories under the Meteorological Council, 1893. 24*s*.
127. Report of the International Meteorological Conference-Paris, 1896. 1*s*.
128. Weekly Weather Report for the Year 1897. Vol. XIV., Third Series. (For Price, &c., see No. 86.)
129. Meteorological Observations at Stations of the Second Order for the year 1894. 27*s*.
130. Report of the Meteorological Council for 1896-97. 8*d*.
131. Hourly Means of the Readings obtained from the Self-Recording Instruments at the Five Observatories under the Meteorological Council, 1894. 24*s*.
132. Monthly Current Charts for the Atlantic Ocean. From information collated and prepared in the Meteorological Office. Published by the Admiralty. 7*s*.
133. Weekly Weather Report for the year 1898. Vol. XV., Third Series. (For Price, &c., see No. 86.)
134. Quarterly Current Charts for the Pacific Ocean. From Information collated and prepared in the Meteorological Office. Published by the Admiralty. 5*s*.
135. Hourly Means of the Readings obtained from the Self-Recording Instruments at the Five Observatories under the Meteorological Council. 1895. 38*s*.
136. Report of the Meteorological Council for 1897-98. 11*d*.
137. Meteorological Observations at Stations of the Second Order for the year 1895. 22*s*. 6*d*.
138. Weekly Weather Report for the year 1899. Vol. XVI. Third Series. (For Price, &c., see No. 86.)
139. Meteorological Observations at Stations of the Second Order for the year 1896. (In the Press.)
140. Report of the Meteorological Council for 1898-99.
141. Hourly Means of the Readings obtained from the Self-Recording Instruments at the Five Observatories under the Meteorological Council, 1896. (In the Press.)
142. Charts of North Atlantic Weather for the Winter of 1898-9. (In the Press.)

LIST OF PUBLICATIONS—*continued.*

NON-OFFICIAL.

No. 1. Report of an Inquiry into the Connexion between Strong Winds and Barometrical Differences.—By Robert H. Scott, Director of the Office. 6*d.*

2. Report to the Committee of the Meteorological Office on the Meteorology of the North Atlantic.—By Captain H. Toynbee, F.R.A.S., Marine Superintendent. 1*s.*

3. Report to the Committee of the Meteorological Office on the Use of Isobaric Curves.—By Captain H. Toynbee, F.R.A.S., Marine Superintendent. [Out of Print.]

4. Routes for Steamers from Aden to the Straits of Sunda and back. Translated from a Paper issued by the Royal Meteorological Institute of the Netherlands. 6*d.*

5. On the Winds, &c., of the North Atlantic along the Tracks of Steamers from the Channel to New York. Translated from a Paper issued by the Deutsche Seewarte, Hamburg. 6*d.*

6. Report of the Proceedings of the Meteorological Conference at Leipzig. 1872. 1*s.*

7. Notes on the Forms of Cyclones in the Southern Indian Ocean.—By C. Meldrum, M.A., F.R.S. [Out of Print.]

8. Report on Weather Telegraphy and Storm Warnings. Presented to the Meteorological Congress at Vienna. 1873. 6*d.*

9. Report of the Permanent Committee of the First International Meteorological Congress at Vienna for 1874. Meetings held at Vienna and Utrecht, 1873-1874. 1*s.* 6*d.*

10. On the Physical Geography of the part of the Atlantic which lies between 20° N. and 10° S. and extends from 10° to 40° W. A Paper read before the British Association at Bristol, in August, 1875.—By Capt. H. Toynbee, F.R.A.S., F.R.G.S., Marine Superintendent. [Out of Print.]

11. Report of the Permanent Committee of the First International Congress at Vienna. Meeting at London, 1876. With Supplement. 2*s.*

12. Reports to the Permanent Committee of the First International Meteorological Congress at Vienna on Atmospheric Electricity, Maritime Meteorology, and Weather Telegraphy, 1878. 2*s.*

13. Report of the Permanent Committee of the First International Congress at Vienna. Meeting at Utrecht, October, 1878. 6*d.*

14. Report of the International Meteorological Committee. Meeting at Berne, 1880. 1*s.*

15. Report of the Second Meeting of the International Meteorological Committee, held at Copenhagen, August 1882. 2*s.* 6*d.*

16. Report of the Third Meeting of the International Meteorological Committee, held at Paris, September 1885. 1*s.*

17. Report of the Fourth Meeting of the International Meteorological Committee, held at Zürich, September, 1888. 4*d.*

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ERRATUM.

"Contents," line 1 *should read* :—

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THE METEOROLOGICAL COUNCIL,

1899–1900.

Lieutenant-General SIR RICHARD STRACHEY, R.E., G.C.S.I., LL.D., F.R.S., Chairman.

MR. ALEXANDER BUCHAN, M.A., LL.D., F.R.S., F.R.S.E.

Professor GEORGE HOWARD DARWIN, M.A., LL.D., D.Sc., F.R.S.

MR. FRANCIS GALTON, M.A., D.C.L., D.Sc., F.R.S.

Rear-Admiral SIR WILLIAM J. L. WHARTON, K.C.B., F.R.S. Hydrographer of the Admiralty.

MR. WILLIAM NAPIER SHAW, M.A., F.R.S., Secretary.

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REPORT

OF THE

METEOROLOGICAL COUNCIL,

For the Year ending 31st of March, 1900,

TO THE

PRESIDENT AND COUNCIL

OF THE

ROYAL SOCIETY.

Changes in the Executive.

The Council have to record important changes in the executive of the Office.

On the 24th June, 1899, Navigating-Lieut. C. W. Baillie, R.N., F.R.A.S., Marine Superintendent, died suddenly; and on 24th July Captain M. W. Campbell Hepworth, R.N.R., from whom the Council have at various times received a number of excellent meteorological logs, was appointed as his successor.

Captain Hepworth commenced his duties at the Office on his return to England from the Pacific in October last.

On the 28th February, 1900, Mr. R. H. Scott, D.Sc., F.R.S., retired from the office of Secretary, and his place was taken by Mr. W. N. Shaw, M.A., F.R.S., a Member of the Council, whose appointment as Secretary had been approved by the President and Council of the Royal Society and by the Lords Commissioners of Her Majesty's Treasury. At the time of his appointment Mr. Shaw was a Fellow and Tutor of Emmanuel College, Lecturer in Experimental Physics, and Assistant Director of the Cavendish Laboratory, Cambridge. He was also a Member of the Kew Observatory Committee of the Royal Society.

By the premature death of Lieutenant Baillie the Council lost the services of an efficient officer, who had carried on the duties of his department with zeal and ability since the retirement of Captain Toynbee on March 21, 1888.

Upon the occasion of Mr. Scott's retirement the Council passed the following resolution:—

Resolved.—"That on the resignation of Mr. R. H. Scott of the post of Secretary, which he has held since the formation

of the Meteorological Council in the year 1876, having previously served in a similar position, as Director, from the time of the institution of the Meteorological Committee in 1867, the Council desire to record their sense of the great value of his services during the prolonged period over which he has discharged the duties of the responsible post which he now quits, and to recognize cordially the constant attention he has bestowed on all the numerous details of the administration, to which the successful management of the business entrusted to the Council has been so greatly due."

Superannuation allowances for Clerks.

After prolonged consideration the Council have formulated a scheme of regulations for the grant of superannuation allowances to Classified Clerks, which has been transmitted to the Royal Society to be reported to the Treasury.

The systematic provision for such allowances has long been recognized as desirable, but its realisation has presented serious difficulties. By the practice of the strictest economy and the reduction of the work of the Office in certain directions the Council have, however, been able to arrange a scheme of appropriation of the grant at its disposal, under which they will be able to make the necessary provision by the purchase of annuities as the occasions for superannuation arise.

The regulations which have been adopted are appended to this report (Appendix I).

National Physical Laboratory.

The management of the Kew Observatory has, from the 1st January, 1900, become vested in the Executive Committee of the National Physical Laboratory. The Council have agreed to continue the allowance made out of their funds for the maintenance of the Meteorological Observations, and for other services rendered to the Council by the Kew Observatory, upon terms identical with those agreed upon between the Council and the Kew Observatory Committee. A statement of these terms is included in the correspondence which is printed in Appendix II.

Ben Nevis Observatories

Further correspondence relating to the maintenance of the Observatories on Ben Nevis and at Fort William, in continuation of that printed in the last Annual Report of the Council (p. 21), will be found in Appendix III.

Telegraphic Reports to Hamburg.

In the course of the summer the Council received an application from Dr. Neumayer, the Director of the Deutsche Seewarte, Hamburg, asking that arrangements might be made for observations to be taken at Blacksod Point, Stornoway, North Shields, and Scilly, at 7 a.m. (in addition to those already taken at 8 a.m.), and transmitted forthwith to the Seewarte, to be incorporated with other observations made at the same hour at continental stations.

The proposed arrangement involved some intricacy in its details because the Rural Post Offices are, as a rule, not open until 8 a.m. The Postmaster-General has, however, lent his assistance, and the Council have been able to comply with the application. The Seewarte bears all the costs of the additional service.

Charges for Weather Inquiries.

Towards the close of the year a suggestion was forwarded to the Council by the Secretary to the Treasury to the effect that the

number of inquiries on the part of the public for weather information by telegram might be considerably increased if the charge made by the Office, in addition to the necessary cost of the telegrams, were reduced from one shilling to sixpence for each inquiry. The Council have lately learned that, in view of such a reduction, the Postmaster-General would be willing to forego the deduction which has hitherto been made by the Post Office from the sums received for inquiries addressed to the Office by telegram on account of the expenses of collecting and transmitting them to the Office. The Council are glad to avail themselves of this opportunity of making the information in their possession more accessible to the public, and desire to record their thanks to Mr. Hanbury and the Postmaster-General for their assistance in the matter.

Acknowledgments.

They have also to record their acknowledgment to the Postmaster-General for the reduction in the extra cost of telegrams on Sundays from certain stations in Ireland, to the War Office for the use of the old guard room at St. Mary's, Scilly and to the Board of Trade for the use of a site and for the erection of a stage for the Robinson Anemograph at Holyhead.

In the discharge of the duties entrusted to them the Council have to rely largely upon the help of volunteer observers on sea and on land, and they desire to record their recognition of the assistance thus afforded them, and their appreciation of the care and skill that have been devoted to securing accurate and regular records.

Administration.

The administration of the Office is conducted by the Secretary, under the direction of the Council, with the assistance of the Marine Superintendent and a staff of 37 clerks and attendants.

Summary of the work of the Office.

The work of the Office may be briefly summarised under the following heads :—

I. OCEAN METEOROLOGY.—The collection, tabulation and discussion of meteorological data for all parts of the ocean traversed by British ships. The preparation and issue of charts or other publications exhibiting the results obtained from the discussion of the observations.

II. WEATHER TELEGRAPHY.—The collection of observations transmitted by telegraph, three times in each day, from selected stations in the British Isles (chiefly on the coasts), and on the Continent of Europe, the preparation of a Daily Report embodying the observations, and of forecasts of weather based upon them, and the issue of warnings to ports on the coasts of the United Kingdom whenever there are indications of the approach of severe storms.

III. CLIMATOLOGY.—The collection of information of various kinds from observatories and other land stations in the British Isles, and from a few stations in British possessions or in Foreign countries, with the view of extending the accurate knowledge of the meteorological conditions obtaining in the various districts in which the observations are made, and of the changes to which they are subject.

IV. LIBRARY.—For the collection and preservation of weather maps and other publications issued by the Colonies and Dependencies of the British Empire, and by Foreign Countries, so that they may be available for consultation by those requiring information as to the weather in various parts of the globe.

V. MISCELLANEOUS INVESTIGATIONS.

VI. PUBLICATIONS.

VII.—FINANCE.

All the branches of the Office are utilised for the preparation of replies to inquiries on questions connected with the weather, which are made from time to time by public bodies or by private persons.

Details of the work of the Office during the past year are given below under the headings which have been enumerated.

PART I.

OCEAN METEOROLOGY.

Collection of Information.

Collection of Information.—The Office systematically collects data with respect to the meteorology of the ocean, and for this purpose complete outfits of meteorological instruments are supplied to selected officers of merchant ships who are willing to make observations at sea.

The instruments supplied are :—

One barometer; six thermometers, with a screen; four hydrometers.

On the return of the ship to England the officer sends in a fair copy of the meteorological log and returns the instruments to the Office or to its agents.

Her Majesty's ships also are supplied with instruments, which, however, differ slightly from those lent to the Mercantile Marine. The Council continues to receive valuable observations from the officers of the Royal Navy.

Agents.

In order to facilitate the supply of instruments to the Mercantile Marine, agencies are established at some of the principal ports.

The following is a list of the agents :—

Cardiff—T. L. Ainsley, Bute Docks.
Dundee—Capt. John McGlashan, Dock Street.
Glasgow—Messrs. D. McGregor and Co., Clyde Place.
Greenock—Messrs. D. McGregor and Co., Brymner Street.
Hull—Messrs. Castle and Co., Commercial Road.
Liverpool—Messrs. D. McGregor and Co., South Castle Street.
Southampton—Capt. D. Forbes, High Street.

The number of merchant ships supplied with instruments and log books during the year has been 96. Taking into account the

ships which had instruments in their possession at the beginning of the year, the approximate number of ships of the merchant service employing instruments belonging to the Office for observations during the year was 209.

Sets of instruments are kept in working order at the Office in London, and at each agency, for the purpose of instructing observers in the method of observation. Notices to captains as to the supply of instruments are frequently distributed from the Office.

Recognition of "excellent" observers.

As a mark of recognition of valuable co-operation, the Council present various publications to observers who return well-kept logs. A list of the publications of the Office is given in Appendix XXI., p. 144.

Appendix IV. (p. 34) contains a list of the observers who have, during the past year, contributed logs classed as "excellent." The Council take this opportunity of expressing their best thanks to those who have thus assisted them. Several of these observers have co-operated with the Office for many years. The names which appear in the list for the first time are as follows :—

Observer's Name.	Ship.
Achard, E. C. S.	"Loch Finlas."
Duguid, W.	S.S. "Prome."
Elliott, G.	S.S. "Breconshire."
Fisher, R. J.	S.S. "Mayfield."
Hayes, B. F.	S.S. "Britannic."
Lawrence, Sub-Lieut. H. J. G., R.N.	H.M.S. "Rambler."
McAllister, W.	S.S. "Clan Ferguson."
Seymour, F. H.	S.S. "Britannia."

Death of observers.

The Council have to note with great regret the death of two of their old observers. Capt. H. M. Lambert, Marine Superintendent and Harbour Master at Newhaven, died in March last. He was formerly an observer for this Office in the P. & O. s.s. "Brindisi." Capt. Wm. Spratly, an old observer, was drowned in February or March last while in command of the s.s. "Cuvier," which was run down in the English Channel. He had supplied the Office with seventeen logs, fourteen of which were "excellent."

Character of logs received.

The meteorological logs received during the year numbered 155, of which 131 were either "excellent" or "very good."

The Council desire to note specially that they have continued to receive, through the Ocean Steamship Company of Liverpool, a considerable number of logs, principally relating to voyages to and from the China Seas viâ Suez. They have also received logs from the Pacific Steam Navigation Company, which have supplied wind observations that are much needed in dealing with the west coast of South America.

A list of the meteorological logs received at the Office from ships during the year is given in Appendix V. (p. 36).

Districts from which observations are obtained.

The following list gives a summary of the voyages for each ocean made by the ships specified in this Appendix :—

North Atlantic ...	.. 500	Pacific Ocean, South	... 109
South „ ...	... 130	Mediterranean ...	... 109
Indian Ocean ...	... 145	Red Sea ...	... 82
Pacific Ocean, North	... 87	Arctic Ocean ...	... 4

Publications.

Various publications of the Office in connexion with ocean meteorology have been either completed during the year or are in progress.

Southern Ocean.

The Meteorology of the Southern Ocean.—The region referred to lies between the Cape of Good Hope and New Zealand, south of latitude 30° S. These charts, which have already been described (*See* Report, 1898, p. 8), have been published since the last Annual Report.

South Atlantic.

The Meteorology of the South Atlantic and of the East and West Coasts of South America.—All the available information extracted from the mercantile logs in the Office, and from those of Her Majesty's Ships has been analysed, and a large proportion of this material has been made use of for discussion. The charting of the data is now being taken in hand. The Hydrographer of the Admiralty has undertaken the publication of the work, his Office having special facilities for disseminating the information provided.

Observations from the Pacific Ocean.

Observations from the Pacific Ocean.—The arrangements described in the Report for 1898, p. 8, for the supply of instruments from Her Majesty's Dockyard at Sydney to observers navigating the Pacific Ocean have been in operation. Arrangements have also been made for the supply of instruments from Her Majesty's Dockyard at Hong Kong to the Commanders of the Canadian-Pacific Railway Company's Steamers running between British Columbia, Japan and China. The observations contained in these logs are of special importance in regard to the material which they afford for the gradual improvement of the Current Charts for the Pacific Ocean issued by the Office.

The Weather of the Winter 1898–99.

The Weather of the Winter, 1898–99, *over the North Atlantic.*—The enquiry which the Council decided upon carrying on, relative to the unusually severe weather which prevailed in the Atlantic during the winter 1898–99, has been completed, and the Charts illustrating the results of the investigations will be ready for publication shortly. In the compilation of this work observations supplied by the log books of about 200 vessels have been utilised, yielding on an average about 60 observations a day. The Office has found great assistance from the valuable data supplied by the Transatlantic Steamship Companies of London and Liverpool, and from observations received through the French and Danish Meteorological Offices. The Daily Weather Charts published by the United States Weather Bureau have furnished valuable information required for that part of the American Continent which is embraced in the charts. Fairly representative Charts for 60 days have been prepared from these observations.

Observations of Drift Ice in Northern Seas.

Drift Ice in Northern Seas.—On behalf of the Danish Meteorological Institute, which has undertaken a work having for its object the collection of information in regard to the state of the ice in the waters East and West of Greenland and elsewhere, within the limits of Arctic navigation, between the months of March and August inclusive, the Office has secured the co-operation of the Captains of several Arctic Whalers, and of two vessels owned by the Hudson's Bay Company.

Instruments for distant stations.

Collection of Meteorological Observations from Distant Stations.—It has been the custom of the Office to supply instruments to observers in unfrequented parts of the world, when it has reason to believe that the observations will be taken with due care, and the observers undertake to send in copies of their observations.

A list of the documents received during the year from these and other foreign land stations is given in Appendix XV. (p. 101).

No new station of this class has been supplied with instruments during the past year.

A siphon mountain barometer has been lent to Mr. E. J. Garwood for use during a tour in the Himalayas in Sikkim, in company with Mr. D. Freshfield.

Information supplied for the Admiralty.

Climatological Information for the Admiralty.—Statistics as to the climates of foreign ports are from time to time required by the Admiralty for use in various publications; a good deal of research is required to supply the necessary information. The districts so dealt with during the year have been New Zealand, various Islands in the Pacific Ocean, and localities in the Ægean Sea.

Stock of instruments belonging to the Office.

Supply and Stock of Instruments.—In Appendix VI. (p. 46) a return is given of the meteorological instruments supplied during the year by the Office to the Royal Navy, together with a statement of the stock and of the distribution of the instruments for the use of the Navy standing on the books at the 31st March, 1900.

Appendix VII. (p. 47) gives similar information with regard to the disposal of the other instruments belonging to the Office, which either remain in store or have been supplied to the Mercantile Marine, to Observatories, or to Telegraphic Stations, &c.

PART II.

Weather Telegraphy and Forecasts.

General

The forecasts issued by the Office of the probable weather throughout the United Kingdom are based on meteorological observations made at a number of stations, which are in direct telegraphic communication with the Office.

The Telegraphic Reporting Stations are those marked with the letter "T" in the list given in Appendix XIII. (p. 62), and the same Appendix contains at p. 69 a list of the Foreign Stations which send daily telegrams to the Office.

Changes in the Stations

There have been a considerable number of changes in the stations during the course of the year. For reasons of economy

the reports from Hawes Junction, York, and Cambridge have been discontinued, in addition to those from Ardrossan mentioned last year, and a station has been established at Portland Bill to take the place of two stations at Hurst Castle and Prawle Point respectively. The new station is, by permission of the authorities of Trinity House, placed in charge of the keeper of the high lighthouse on the Bill, and affords a very satisfactory exposure of the instruments.

With the sanction of the Admiral-Superintendent of Naval Reserves, the instruments hitherto located at Belmullet have been transferred to Blacksod Point, and placed in charge of the Coastguard officer there.

Observations from Lloyd's Signal Stations.

By way of supplementing the observations of weather on the coast transmitted by telegram, the Office gladly accepted the offer made by Colonel Hozier, C.B., on behalf of Lloyd's, to send periodically by post records of weather from the following signal stations maintained by Lloyd's, viz., Butt of Lewis, Tory Island, Brow Head, Kildonan, Calf of Man, Lundy Island, Barry Island, the Lizard, Prawle Point, St. Catherine's Point, Beachy Head, Dunnet Head, St. Abb's Head, Flamborough Head, Deal.

Inspection of the Stations.

Inspection of the Telegraphic Reporting Stations.—The stations in the United Kingdom have been inspected during the year, those in England by Messrs. Gaster, R. H. Curtis, J. A. Curtis, and Brodie of the Meteorological Office; those in Scotland by Mr. Buchan, and in Ireland and Wales by Mr. Scott.

The Reports of the Inspectors are printed in Appendix XIV. (p. 73); they show that efficiency has been maintained.

Discussion of the observations.

Discussion and Publication of the Information received.—A detailed account of the manner in which the meteorological information received by telegraph is utilised was given in Appendix X. of the Report for 1891, and there has been no change of procedure since that date. The Daily Weather Report contains a synopsis of the weather on the day of issue, based on the telegraphic data; this has appeared regularly during the year.

Distribution of reports.

About 250 copies of the Daily Weather Report are distributed without charge to newspapers, for public exhibition at seaports, to Government Offices and public institutions, to correspondents of the Office, and to foreign meteorological institutions. The issue to subscribers amounted to about 165 copies.

Weekly Weather Report.

The Weekly Weather Report, and the various Appendices, contain Weekly and Monthly Summaries of the chief elements of the Weather. Details as to those publications are contained in Part III., p. 19, and in Appendix VIII., p. 48.

Display of information in front of the Office.

Display at the Meteorological Office in London of Information as to the Weather on British Coasts.—At 9.30 a.m. and 3 p.m. every week day the substance of the reports received by telegraph, as to the state of the weather and of the sea at the following stations: Yarmouth, Dover (Dungeness), Portland Bill, Scilly, Holyhead, and Valencia Island, is conspicuously displayed on the balcony of the Office, at 63, Victoria Street, S.W. At the same hours charts are suspended in the portico of the street door, which exhibit the

latest information from all our coasts, and the latest forecasts and storm warnings that have been issued.

Forecasts for the Admiralty.

Supply of Forecasts to the Admiralty.—At the request of the Admiralty daily forecasts are supplied regularly to the Commander-in-Chief, at Devonport.

Forecasts.

Weather Forecasts.—Forecasts are now made twice a day, namely, at 11 a.m. and 8.30 p.m. The forecasts issued at 11 a.m. are based on the telegrams of observations made at 8 a.m., and refer to a period of 24 hours from noon on the day of issue. These forecasts are exhibited at several places in London,* and are supplied to newspapers for their later editions. The forecasts at 8.30 p.m. are prepared for the next morning's newspapers. Each of the forecasts has its special applicability, and is available to the public on inquiry at the Office either by letter, by telegram, or in person. The inquiries received by telegram through the Post Office for special forecasts amounted during the year to 90 and the personal applications to 69. The rules of the Office relating to such inquiries are stated in Appendix VIII., p. 52.

Inquiries at the Office.

Results of Forecasts.

A comparison for the year of the Forecasts for the United Kingdom issued at 8.30 p.m., with the subsequent weather actually experienced, is given in detail in Appendix IX., p. 53. The complete success, partial success, partial failure, and complete failure of the forecast is estimated according to definite rules which are designed to eliminate bias as far as possible.

It will here suffice to state that partial success means that the Forecast was correct for more than half the elements dealt with at the places of observation situated in the district in question, and a similar interpretation is to be applied to the term partial in the case of the failures.

Results of Forecasts.

The detailed comparison of the Forecasts with actuality may be summarised as follows :—

SUMMARY of RESULTS of 8.30 p.m. FORECASTS, 1899-1900.

Districts.	Per-centages.				
	Complete Success.	Partial Success.	Partial Failure.	Complete Failure.	Sum of Successes, Complete and Partial.
SCOTLAND, N. ...	56	26	12	6	82
„ E. ...	52	28	13	7	80
ENGLAND, N.E. ...	54	31	11	4	85
„ E.	52	29	14	5	81
MIDLAND COUNTIES...	57	28	13	2	85
ENGLAND, S.	58	29	11	2	87
SCOTLAND, W. ...	58	24	10	8	82
ENGLAND, N.W. ...	55	24	14	7	79
„ S.W. ...	59	23	12	6	82
IRELAND, N.	52	29	13	6	81
„ S.	49	29	13	9	78
Summary ...	55	27	12	6	82

* In the City at the Mansion House, Lloyd's Rooms, Messrs. R. & J. Beck's, Cornhill, and Messrs. de la Rue & Co.'s, Bunhill Row ; in the West End, in the Libraries of the House of Lords and the House of Commons ; at Messrs. Elliott's, St. Martin's Lane ; Messrs. Stanford's, Charing Cross ; Messrs. Negretti & Zambra's, Regent Street ; and at the Office, 63, Victoria Street.

In order to test the success of the Forecasts of the year in comparison with those of previous ones, the following table has been drawn up. It shows for each year of the decade 1890–99 the per-centages of complete and partial success of the Forecast issued at 8.30 p.m. It will be noticed that the highest degree of complete success was obtained in 1893, and that 1899 did not fall far short of that figure, and the number of complete successes was above the average for the whole decade.

PER-CENTAGES of SUCCESS in the FORECASTS for the whole of the BRITISH ISLES.

Year.	Complete Success.	Partial Success.	Sum of Successes, Complete and Partial.
1890	50	32	82
1891	50	30	80
1892	46	33	79
1893	59	25	84
1894	56	27	83
1895	55	25	80
1896	54	27	81
1897	55	26	81
1898	55	28	83
1899	55	27	82
Average	53·5	28·0	81·5

Harvest Forecasts.

Harvest Forecasts.—The practice of distributing, by telegraph, special Forecasts to a selected number of prominent Agriculturists in the several districts of England, Scotland, and Ireland during the period of harvest, had been continued for a long period, in order to give the Council an opportunity of putting the Forecasts to a practical test. The returns of success and failure were made up from the observations of the recipients themselves, and for many years past the totals of partial and complete success had reached an average of about 90 per cent. for all districts, varying from 76 per cent. for Ireland, N., to 96 per cent. for England, S.

In May 1899, the Council decided that the free distribution of the Forecasts should be discontinued, and a circular was issued announcing this decision, and stating that the Forecasts would be sent to applicants who were willing to pay the cost of the daily telegram, without any additional charge. Twenty applications for the Forecasts were received, one from Scotland, W., and the remainder from the various districts of England, and Forecasts were sent daily at 3.30 p.m. for varying periods extending in the whole over eight weeks.

Storm Warnings.

Storm Warnings for the Coasts of the United Kingdom.—Warnings of coming storms are dispatched by telegraph to certain stations on the coast. These stations are supplied with signals which are hoisted as warnings to mariners of expected storms. The signals are defined in Circular 717 of the Board of Trade, issued in February, 1874.

A ist of the stations is given in Appendix X., p. 54. At the end of March, 1900, there were 234, of which 121 were in England and Wales, 70 in Scotland, 31 in Ireland, 4 in the Isle of Man, and 3 in the Channel Islands.

A comparison has been made in the Office between the warnings issued during the year and the subsequent weather actually experienced. The method of comparison is explained in Appendix VIII., p. 52, and the results are exhibited in the following table :—

Storm Warning Checking.

Comparison between the Warnings and the subsequent Weather in 1899.

Coasts.	Total No. of Warnings.	Warnings justified by subsequent Gales. Force 9 and upwards.	Warnings justified by subsequent strong Winds. Forces 6 & 7.	Warnings not justified by subsequent Weather.	Warnings late. Force 9 reached at two Stations before issue.	Warnings partially late. Force 9 reached at one Station before issue.	Warnings issued in consequence of telegraphic errors.	Storms for which no Warning was issued.
Scotland, N.E. ...	47	36	7	4	—	—	—	Oct. 29.
,, E. ...	32	8	16	8	—	—	—	—
,, N.W. ...	48	27	17	2	1	1	—	Sept. 18.
,, W. ...	48	18	28	2	—	—	—	—
Ireland, S.W. ...	47	30	12	3	2	—	—	Jan. 11–12.
,, N.W. ...	53	34	13	—	3	3	—	Sept. 18.
Irish Sea	39	25	12	—	—	2	—	Sept. 18, Sept. 22.
St. George's Channel	33	18	11	2	1	1	—	Sept. 22.
Bristol Channel ...	36	30	4	—	—	2	—	—
England, S.W. ...	34	25	7	—	—	2	—	—
,, S. ...	26	13	13	—	—	—	—	—
,, S.E. ...	22	10	11	1	—	—	—	—
,, E. ...	19	14	5	—	—	—	—	Sept 22, Sept. 30.
,, N.E. ...	20	11	5	2	1	1	—	Jan. 18, Mar. 28–29.
Totals ...	504	299	161	24	8	12	—	
Percentages...		59·3	31·9	4·8	1·6	2·4	—	

Notes as to Gales experienced in 1899, for which no Warning was issued.

January 11th.—Ireland, S.W. A W. to N. W. gale.

Very sporadic, and no indication of its advent at 6 p.m. on 10th. Barometer rising,

January 12th.—Ireland, S.W. A W. to N.W. gale.

Very sudden. No indication of its approach at 6 p.m. on 11th, (Previously noted gale was then passing off.)

January 18th.—ENGLAND. N.E. A S.W. gale.

The W. and N. coasts were duly warned, but the air driving through the valley of the Solway caused a gale on the Northumberland coast which had not been warned.

March 28th–29th.—ENGLAND, N. E. A S.W. to W. gale.

Our W., S.W. and S.E. coasts had been duly warned, but gale extended to N.E. coast also.

September 18th (Sunday).—SCOTLAND, N.W.; IRELAND, N.W.; and IRISH SEA.

A deep secondary disturbance reached Scotland from the N.W. on night of 17th–18th.

September 22nd.—IRISH SEA, ST. GEORGE'S CHANNEL, and ENGLAND, E. A W. to N.W. gale.

Scotland and Ireland had been warned at 2.30 p.m. on 21st, but the depressions moved so rapidly, that by 8 a.m., 22nd, our E. coasts were already involved.

September 30th.—ENGLAND, E. A gale from various points.

A very complex condition prevailed on 29th, and the appearance on the E. coast was *doubtful*, but hardly justified warning.

October 29th (Sunday).—SCOTLAND, N.E.

Our W. and N.W. coasts were duly warned on morning of 29th, but the depression unexpectedly grew rapidly deeper, and in the absence of 2 p.m. reports the non-warning was unadvoidable.

Comparison of results for 1899 with previous years.

The following table contains a statement of the amount of success of storm warnings in the decade 1890–99 :—

Years.	Total No. of Warnings issued.	Warnings justified by subsequent Gales.	Warnings justified by subsequent strong Winds.	Total Warnings justified.	Warnings not justified by subsequent Weather.
		p.c.	p.c.	p.c.	p.c.
1890	525	61·0	25·5	86·5	9·3
1891	522	62·3	24·5	86·8	7·5
1892	488	59·4	31·2	90·6	6·8
1893	480	60·8	28·6	89·4	7·1
1894	502	68·5	23·5	92·0	6·0
1895	523	63·3	26·4	89·7	8·0
1896	467	67·7	23·8	91·5	2·9
1897	596	60·1	31·7	91·8	4·5
1898	581	59·8	27·5	87·3	4·5
1899	504	59·3	31·9	91·2	4·8

Fishery Barometers.

Fishery Barometers.—Barometers have for many years been lent by the Office to fishing villages and other places on the coast for the benefit of sailors and fishermen. A list of the stations thus provided is given in Appendix XI., p. 57. There are 220 stations of this kind, of which 67 are in England, 7 in Wales, 62 in Ireland, 79 in Scotland, 4 in the Isle of Man, and 1 in Jersey.

PART III.

CLIMATOLOGY.

I.—BRITISH ISLES.

Stations supplying Information.

The Council do not attempt to deal completely with the details of the Climatology of the British Isles. It has been their practice to subsidise or maintain an intimate relationship with a small number of observatories of the highest class, to obtain continuous records of barometric changes, of the direction and force of the wind, or of sunshine, from other suitably placed stations, and to compile statistics from the observations sent in from these and from Telegraphic Reporting Stations and to supplement them by observations sent to the Office periodically from other land stations in various parts of the country.

Classification of Stations.

The various observing stations of the Office fall consequently into groups according to the nature and completeness of the information which they supply, and the seven categories in which they are classified are as follows :—

Observatories of first order.

1. *Observatories of the First Order*, maintained or subsidised by the Office, and furnishing continuous photographic records of the barometrical pressure and the temperature, and continuous records of rainfall, wind, and bright sunshine, with frequent eye observations of the weather and of the kind and amount of cloud.

Anemographic Stations.

2. *Anemographic Stations* which furnish continuous records of the direction and force of the wind.

Barographic Stations.

3. *Barographic Stations* which furnish continuous records from the aneroid barometer.

Sunshine Stations.

4. *Sunshine Stations* which furnish continuous records of bright sunshine. At nearly all of these the record is made by the Campbell-Stokes instrument, of which an account was given in the Annual Report of the Office for 1879, p. 32.

Telegraphic Reporting Stations.

5. *Telegraphic Reporting Stations* which furnish the data for the forecasts and storm warnings, as explained in Part II.

Second Order Stations.

6. *Stations of the Second Order* which furnish complete climatological data. The observations are taken twice a day; the observers are volunteers, and they provide their own outfit of instruments.

Third Order Stations.

7. *Stations of the Third Order* which resemble those of the second order, except that the information sent to the Office is less full.

Sea Temperature Stations.

8. *Sea Temperature Stations*, at which observations of the temperature of the sea-surface and of the air are taken twice a day. These are nearly all either Coast Guard Stations or Light Vessels.

List of Stations.

A complete list of all the stations is given in Appendix XIII., p. 62. The nature of the information supplied by each station is indicated by the letters in the last column but one of the table, as explained on pp. 62 and 63. It should, however, be mentioned that some of the stations which supply the Office with information corresponding to stations of the Second Order and classified in the list accordingly are in reality Observatories of the First Order, such as the Observatory of the Mersey Docks

and Harbour Board at Bidston, Liverpool, and the Radcliffe Observatory at Oxford.

The stations may be summarised as follows :—

Class.	Description.	Number.
1	Observatories	8
2	Anemographic stations	15
3	Barographic (Aneroid) stations	16
4	Sunshine stations	73
5	Telegraphic stations	30
6	Second Order stations	84
7	Third Order stations	87
8	Sea Temperature stations	50

The majority of the stations included in the list are in direct communication with the Office, but some of them, on the other hand, make returns to the Royal Meteorological Society and others to the Scottish Meteorological Society, and, by special arrangements with the Societies, copies of the observations, or of monthly summaries, are prepared by them and forwarded to the Office to be incorporated with those furnished directly to the Office.

Inspection of Stations.

Inspection of the Stations.—In order to secure uniformity of method and to guard against instrumental errors, the stations classified under the heads 1, 2, 5, and 6 are regularly inspected, while those in Classes 3, 4, and 7 are visited as opportunity offers. The stations of Class 6, which belong to the Royal Meteorological Society, are visited by an Inspector appointed by that Society. In accordance with the recommendation of the Treasury Committee (1877), a contribution towards the cost of this inspection is made by the Office. The rest of the stations of Class 6 are visited, in most cases annually, by the Inspectors of the Office. The inspection of the principal observatories and of some of the anemographic stations was carried out by Messrs. T. W. Baker and E. G. Constable, of Kew Observatory.

Extracts from the reports of the Inspectors are given in Appendix XIV., p. 73.

Presentation of the Results obtained.

Discussion of the Observations.—Detailed information as to the mode of dealing with the material which is thus obtained is given in Appendix XII., p. 58. It will be sufficient here to give a general indication of the forms adopted for the presentation of the results obtained from the observations.

First Order Stations.

Observatories of the First Order.—After careful examination of the curves traced by the instruments, and of the measurements of the curves made at the observatories, the readings for each hour are tabulated, and from them a volume is prepared giving the means of the readings for the several hours, of barometric pressure, temperature, wind, rainfall, and sunshine, for each consecutive group of five days, for the months, and for the year.

The form adopted for the presentation of these observations has been varied from time to time. For some years the curves themselves were reproduced. From 1874 to 1886 the hourly readings at the several observatories were published; but from

1887 the plan now in use, of giving the five-day means, was adopted, while in the volume for 1895, at the suggestion of the International Conference at Paris, the hourly readings at Kew and Valencia were included in addition, and this was continued in the volume for 1896 prepared in the current year.

Means of the meteorological elements for each hour of the day over a long period of years are also occasionally prepared ; and the harmonic components are calculated for the curve representing the diurnal variation of pressure and temperature for the hourly means thus obtained for the several months over which the observations extend.

Anemograph Stations.

Anemograph Stations.—The returns from the Anemograph Stations are used for checking the accuracy of storm warnings. They have also been found to be of considerable importance from time to time in affording evidence in Courts of Law, and the information derived from Sunshine Stations has been found to have a similar application.

Comparisons of the results of different forms of anemometer and of the records at different stations are made from time to time, to furnish evidence as to the best form of anemometer for use in any particular circumstances, and the proper meaning to be attached to the readings obtained, which are still questions open to considerable doubt.

Telegraphic Reporting Stations.

Telegraphic Reporting Stations.—The observations made at 8 a.m. and 6 p.m. at Telegraphic Reporting Stations, supplemented by records of maximum and minimum temperature, duration of sunshine and rainfall at other climatological stations, furnish the materials for a weekly statement of mean and extreme temperature, "accumulated" temperature, Rainfall and Sunshine in the principal wheat growing and grazing districts of the British Isles, with quarterly and annual summaries for agricultural purposes. These are included in the Weekly Weather Report and its appendices. Tables of means of pressure, temperature, and other elements for the Telegraphic Reporting Stations are prepared from time to time and issued as a supplement to the Daily or Weekly Report. The preparation of the means for the 30 years 1871–1900 is now in progress.

Second Order Stations.

Second Order Stations.—The returns from all the Second Order Stations are arranged to give monthly means of pressure and temperature at 9 a.m. and 9 p.m., with the means of maximum and minimum temperature for the month, as well as data concerning rainfall, the direction and force of the wind, &c. These are arranged in a form "B," adopted for International use by the Meteorological Congress at Rome in 1879 ; while for certain selected stations the details of the actual observations made at 9 a.m. and 9 p.m., with intermediate observations of the actual state of the weather, are set out *in extenso* in a form "A," adopted in a similar manner. These returns are prepared with a view to the publication of an annual volume, which is entitled "*Observations at Stations of the Second Order*," of which twenty-two volumes have been issued, the last being that for 1896.

The volume for 1896 differs from that for 1895 by the disappearance from the "A" list of Margate, and from the 'B" list of Brookeborough, Co. Fermanagh, and by the inclusion of

Woolacombe, North Devon, as an "A" station in place of Margate, and the addition to the "B" list of four stations—namely, Strathpeffer Spa, Gilcrux, near Maryport, Belvoir Castle, Grantham, and Norwood in South London, thus increasing the total number of stations by three.

Reports supplied to Registrar-General for Ireland.

Weekly results of the Temperature and Rainfall Observations are also prepared and regularly supplied to the Registrar-General for Ireland from 10 of the Irish stations for use in his "Weekly Return of Births and Deaths," while a full table of Monthly and Quarterly results from seven stations is prepared in the Office, and supplied to him at the beginning of each quarter for publication in his "Quarterly Return of Marriages, Births, and Deaths."

Sea Temperature Stations.

Sea Temperature Stations.—Daily observations of the temperature of the sea-surface have been taken since 1879 at a number of stations. The observations for the three years 1879–1882 were used in the preparation of the "Meteorological Atlas," published in 1883.

In May last year, Mr. H. N. Dickson contributed to the Royal Meteorological Society a paper on "The Mean Temperature of "the Surface Water of the Sea round the British Coasts, and its "relation to the Mean Temperature of the Air," based upon the observations lent by the Meteorological Council.

Foreign and Colonial Stations.

Observations made at various Foreign and Colonial Stations are regularly received at the Meteorological Office.

During the year under review returns from 43 such stations have come in, and a list of them will be found in Appendix XV., p. 101.

The information contained in these returns varies considerably. At some stations a full set of observations is recorded twice daily, while at others only Rainfall and Temperature, or Rainfall alone is noted. These returns are being treated in the same way as those from stations of the second and third orders (Classes 6 and 7, page 17), and the Council has authorized the regular publication of the results in volumes that—after the first one—will appear at five yearly intervals. It had been hoped that the first volume would have been issued during the year 1899-1900, but although a considerable amount of preparatory work has been done upon it, nothing is as yet in print. Efforts will be made to have the volume published during the current year.

Six of the stations referred to are in the Island of Cyprus, where the observations are taken under the direction of Dr. Heidenstam, the Chief Medical Officer. The Tables of results of these observations required for the Cyprus Blue Books have been prepared in the Office as in previous years.

PART IV.

Library.

The main part of the Library consists of the weather maps and other publications of the weather offices of different countries, and meteorological reports and publications received from all quarters of the globe. Most of these are presented or obtained

by way of exchange, but a few standard works and serial publications are purchased. Each work, immediately on receipt, is entered on a card under the author's name, and is subsequently entered in a classified catalogue under the subject to which it refers. The Library consists at present of about 15,500 volumes and pamphlets.

Appendix XVIII., p. 114, gives a list of the additions to the Library during the year. These amounted to 482 books and pamphlets.

PART V.

Miscellaneous Investigations.

Comparison of the Results of Anemometers.

Anemometer Experiments.—The four anemometers of different patterns, viz., the Robinson Anemometer, the Bridled Anemometer, the Pressure Tube and the Pressure Plate Anemometers are still in action at Holyhead, and the records obtained from them have been examined in the Office by Mr. R. H. Curtis who, for some years past, has given special attention to this subject.

The Robinson Anemometer has been removed from its old site to a much more suitable one upon Salt Island, where a very satisfactory stand for it has been erected by Mr. F. Cotton, C.E., the Harbour Engineer. (*See* p. 7, and Report of Inspection, p. 84.)

A short paper by Mr. R. H. Curtis, giving some additional results of the comparison of the records is printed in Appendix XVI., p. 104.

Atmospheric Electricity.

Atmospheric Electricity.—As mentioned in their last Report (p. 19), the Council had arranged with Mr. C. T. R. Wilson, F.R.S., of Sidney Sussex College, Cambridge, for an investigation of certain phenomena connected with atmospheric electricity with the view of enabling the Council to make effective use of the records of atmospheric electricity which have been continued for many years at Kew Observatory, and a grant of £200 had been obtained for this purpose from the Government Grant Committee.

The provisional programme adopted by the Council after consultation with Mr. Wilson dealt partly with an examination of the records obtained at Kew and at other observatories at which records of electrical potential are kept, and partly of experimental work intended to elucidate the process of electrification of the atmosphere.

To carry out the programme of work in connexion with the records of observatories the Astronomer Royal kindly allowed the Greenwich records to be used for comparison with those of Kew. It appeared however that the practice adopted in the mounting and use of the instruments at the two observatories is too widely different for any effective comparison of the atmospheric data to be practicable, and this difficulty has prevented the further prosecution of that part of the programme up to the present time.

Mr. Wilson has been very successful in the experimental work which has been carried on in Cambridge, either at the Cavendish Laboratory or in a field near the observatory, kindly placed at his disposal by Professor Sir R. S. Ball. In May, 1899, he completed an important paper "On the Comparative Efficiency as

Condensation Nuclei of Positively and Negatively charged Ions," which was forwarded by the Council to the Royal Society and has been published in the Philosophical Transactions (vol. 193, A., p. 289). The results of this paper are particularly valuable because they apply to problems of direct meteorological importance the most recent developments of the physical investigation of electrical discharges, itself largely carried out at the Cavendish Laboratory. They also supplement work which is being prosecuted upon somewhat similar lines on the Continent, particularly by Professors Elster and Geitel, of Wolfenbüttel, so that it seems probable that important modifications and extensions of our views of the origin of Atmospheric Electricity will be reached. Some outstanding questions still remain, such as the possibility of the existence in the atmosphere of air in a state suitable for the condensation associated with electrical effects to take place; but such problems are of general scientific interest, and there is no doubt that the discussion will be continued.

In the course of his inquiry into the means for registering the potential of the atmosphere, Mr. Wilson has noticed a remarkable action of the collectors of electricity, which requires further investigation.

In order to enable Mr. Wilson to carry on these researches the Council have received, in addition to the original grant of £200 from the Government Grant Committee referred to in last year's report, a further grant of £100 from the same Committee, and an application for an additional grant of £100 to complete the total of £200 for two years is now (May, 1900) under the consideration of the Committee.

A letter setting forth the grounds of the application together with Mr. Wilson's preliminary programme and his further report on the stage which the investigation had reached at the beginning of the current year, 1900, are printed in Appendix XVII., p. 108.

The Council regret that they have been hitherto unable to furnish the means of investigation of the upper strata of the atmosphere by means of the balloon observations which Mr. Wilson's second report indicates as desirable. Apart from questions of expense there are special difficulties attending the prosecution of such experiments in England by means either of balloons or kites. The comparative nearness to the coast of all stations in these islands, the disposition of the land and its intersection by enclosures and roads, tend to aggravate the possible consequences of any misadventure with the apparatus, and having regard to these circumstances the Council are not at present aware of any site that would be both suitable and available for experiments of this character, which could not be carried out without a specially organized staff, at considerable expense.

Small Oscillations of Sea Level.

The Use of Small Oscillations of Sea Level in forecasting weather.—The Council have received through Professor Darwin a suggestion from Mr. F. Napier Denison, now of the British Columbia Weather Service, to the effect that certain small oscillations in the sea level, noticed in the records of tide gauges, were connected with atmospheric disturbances, and might prove useful in forecasting weather. (*See* British Association Report,

1899). The Council have at present no means for putting this suggestion to a really satisfactory test, but through the kindness of the Admiralty in lending a selection of the tidal records of the Portland Bill tide gauge, they have been able to institute a comparison between the oscillations noticed in the records for that station, and the march of the weather in the British Islands. No correspondence between the two has been recognised in the comparison, but the peculiarities of the tidal records and of the weather during the period selected made it impossible to form any final opinion upon the matter, which is one of very considerable theoretical and practical interest. It is one, however, which cannot be properly investigated without special experimental appliances, which the Council have at present no means of furnishing or using.

PART VI.

PUBLICATIONS.

Daily and Weekly Weather Reports.

During the year the Office has prepared and issued regularly the Daily and Weekly Weather Reports (*see* pp. 12 and 48) with Monthly, Quarterly, and Annual Summaries. These publications are issued to subscribers as well as to certain Public Offices and Institutions, and to foreign Weather Offices in exchange for similar publications. The number of subscribers for the Daily Weather Report has been about 165.

The publication of the Charts for the Southern Ocean has already been referred to, p 10.

Atlantic Weather Maps for Winter of 1898–9.

The Office work in connexion with the preparation of Weather Charts for the North Atlantic Ocean during the exceptional weather of the winter of 1898–9 (*see* p. 10) has been completed and the Charts will shortly be ready for issue.

Observations from First and Second Order Stations.

The annual volume embodying the observations taken at the five Observatories of the First Order (*see* p. 18) in connexion with the Office, during the year 1896, and the volume based upon observations in the same year at stations of the Second Order (*see* p. 19) have been completed and issued. The corresponding volumes for 1897 are now being prepared. The publication of the volume of results for 1895 from the Observatories of the First Order also falls, as a matter of fact, within this year, as it was not quite completed at the close of last year (*see* Report for 1899, p. 18).

International Conference

The translation into English of the Report of Proceedings at the St. Petersburg meeting in September 1899 of the International Meteorological Committee has been completed, and the English version will be issued shortly.

Diurnal Range of Rain.

Mr. Scott's paper on the Diurnal Range of Rain during the 20 years (1871–90), recorded by the Beckley's self-recording gauge at the seven observatories in connexion with the Office, has been published.

Weather Types

A paper upon Types of Weather, by Mr. E. Douglas Archibald, has been under the consideration of the Council. The paper deals with the practicability of making forecasts of weather for a longer period than the *one day in advance*, to which the forecast of the Office are restricted, by applying to the weather maps of the

British Islands certain principles which, according to the researches of MM. van Bebber and Teisserenc de Bort on the Continent, may be supposed to underlie successive changes in the weather over Europe. The Council are of opinion that the subject is of such practical importance that the paper should be made accessible for those who are interested in the further development of the principles of weather prediction, and they have accordingly decided to undertake the publication of the paper by the Office.

Previous Publications.

A complete list of publications issued by the Office is given in Appendix XXI., p. 144, and in Appendix XX., p. 138, is given a list of important contributions to meteorology, which have not been issued as separate publications, but have been included in various reports issued by the Office since 1866.

PART VII.

FINANCE.

Appendix XIX., p. 137, shows the receipts and payments during the year ending 31st March 1900. The amount voted by Parliament was 15,300*l.*, as in the previous year, and the miscellaneous receipts amounted to £1,039 9*s.* 4*d.* In addition to these amounts the sum of £100 was received from the Government Grant Committee, as above explained.

The following abstract of expenditure shows the true net charge against the Parliamentary grants of this and the preceding year, together with the increase or decrease in 1899–1900, as compared with the previous year :—

NET EXPENDITURE.	1898–99.	1899–1900.	Increase.	Decrease.
GENERAL ADMINISTRATION :				
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Payment of Council ...	990 0 0	1,721 7 2	—	68 12 10
Secretary	800 0 0			
Office	930 0 0	909 13 6	—	20 6 6
Rent, Fuel, and Lighting	710 13 2	726 11 7	15 18 5	—
Alterations to premises and contingencies ...	236 2 9	262 14 0	26 11 3	—
Expenses incidental to International Meteorological Congress ...	4 3 10	3 5 0	—	0 18 10
Pensions	144 0 0	177 6 8	33 6 8	—
SPECIAL RESEARCHES ...	786 11 5	900 5 4	113 13 11	—
LAND METEOROLOGY ...	3,609 3 0	3,298 4 8	—	310 18 4
WEATHER INFORMATION ...	3,871 13 2	3,477 12 10	—	394 0 4
INSPECTIONS	431 17 4	434 11 4	2 14 0	—
OCEAN METEOROLOGY ...	2,489 1 7	2,276 4 3	—	212 17 4
Total ... ... £	15,003 6 3	14,187 16 4	192 4 3	1007 14 2†

In the year 1899–1900 the sum of £1,403 6*s.* 1*d.* was paid to the Post Office on account of inland and foreign telegrams, allowances to telegraph clerks, rental of private wires, &c.

(Signed) R. STRACHEY.
Chairman.

June, 1900.

† At the close of the year £400 per annum was, with the sanction of the Treasury, assigned as a pension to the retiring Secretary and £1,500 is required to provide superannuation allowance for a retiring Clerk in the ensuing year.

APPENDIX.

APPENDIX I.

Regulations for Superannuation Allowances for Classified Clerks.

Subject to the continuance of the Parliamentary grant now made, the Meteorological Council will make provision for superannuation allowances for Classified Clerks on the following basis :—

1. Every clerk will be retired on his attaining the age of 65 years unless his service be specially extended by the Council. On being so retired he will receive a yearly allowance not exceeding one-half of his average salary during the last three years of his service. Provided that the maximum allowance will be at the rate of £150 per annum, after approved service of not less than 30 years.
2. For the purpose of these regulations, regular payments authorised by the Council for attendance in the evenings and on Sundays will be reckoned in computing the annual salary, but no other allowances beyond the normal annual salary, fixed under the regulations of the Council from time to time, will be so reckoned.
3. The provision made by the Council for superannuation allowances under Regulation 1, will be based upon the assumption that such superannuations will not take place oftener than at the rate of one in every two years.
4. Should the services of any clerk be dispensed with by the Council before he reaches the age of 65 years, on reduction of establishment, on account of ill-health, or for any other reason except for misconduct or incapacity (as to which causes of disqualification the decision of the Council shall be final), the Council will take into consideration the length of service of the clerk whose services are dispensed with, and will make such retiring allowance as they may think fit at the time, but in no case will the allowance exceed an annual payment of ten-sixtieths of the clerk's average salary during the last three years of his service, in respect of the first twenty years of approved service, together with one additional sixtieth of such salary for each additional year of service after the twentieth.
5. In all cases, for the purposes of these regulations, service under the Council shall be only reckoned after the age of 25 years.

6. Retiring allowances will be paid quarterly, and the payments will be subject to such regulations as the Council may prescribe as to furnishing life certificates, or the like.

7. The Council will recognise no alienation or assignment of any retiring allowance granted under these rules, and they reserve the right to cancel any retiring allowance in the event of the insolvency of the person to whom it was granted, or of any flagrant misconduct on his part.

8. The customary right of the Council to dispense with the services of persons in their employment, after due notice, at their discretion, shall not be affected by these regulations.

9. Voluntary retirements from the service of the Council will give no claim to superannuation or retiring allowances.

10. These rules are subject to alteration from time to time by the Council, aud no claim or vested interest shall be created by these or any similar rules having been in force at any time during the period of service of any clerk.

APPENDIX II.

CORRESPONDENCE relating to the CONTINUATION with the NATIONAL PHYSICAL LABORATORY of the relations hitherto subsisting between the METEOROLOGICAL OFFICE and KEW OBSERVATORY.

(1.)

Meteorological Office, 31st October, 1899.

SIR,

As a part of the arrangements made consequent on the contemplated transfer of the Kew Observatory to the National Physical Laboratory, it has been agreed by the Meteorological Council that the relations hitherto subsisting between the Council and Kew shall be continued after the transfer has taken effect.

As it will be desirable that there shall be a definite record made of the relations thus referred to, I am to request that you will be so good as to convey to the Council your approval of the annexed Memorandum, designed to supply such a record, subject to any modifications that may appear to you to be necessary to bring it into accord with what the Kew Committee consider to be the understanding under which the Meteorological Office has received from the Kew Observatory the records of observations made there, and has obtained certain services from the staff of the observatory.

I am, &c.,

ROBERT H. SCOTT, Secretary.

The Chairman of the Kew Committee
of the Royal Society, Kew Observatory.

MEMORANDUM.

In the year 1869 the Meteorological Office agreed to grant to Kew a sum of £250 as an ordinary self-recording observatory, and £400 in addition for undertaking the examination of the records and tabulations of all the observatories maintained by the Meteorological Office. In 1871, on the Royal Society taking over the charge of the Kew Observatory from the British Association, the Meteorological Committee undertook to continue the grants on the former basis. In 1876, shortly before the Meteorological Council was established, the grant was re-considered, and the amount was reduced to £400, with the consent of the Kew Committee, in accordance with the terms of the following resolution :—

> "Mr. Scott was instructed to arrange with Mr. Whipple (the Superintendent of the observatory) for the relinquishment by Kew of the examination of the records and tabulations from all observatories, together with a reduction of the sum allocated to Kew by the Meteorological Office, and to propose that in future a sum of £400 a year shall be given, in lieu of the present sum of £650 (£250 observatory and

£400 examination), on condition that a qualified assistant be kept at the observatory ready to be sent wherever his services may from time to time be required."

Under these arrangements, which have not since been changed, the Kew Observatory has supplied the Meteorological Office with the following observations :—

* *Atmospheric Pressure* (continuous) by the Barograph.

——————— 5 check readings daily of the Standard barometer, attached thermometer, and Barograph thermometer.

* *Temperature of the Air* (continuous) by the Thermograph.

——————— 5 check readings of the Standard thermometer daily.

——————— Daily Maximum and Minimum at 10 p.m.

* *Temperature of Evaporation* (continuous) by the Thermograph.

——————— 5 check readings of the Standard thermometer daily.

* *Direction of the Wind* (continuous) by anemometer.

* *Velocity of the Wind* (continuous) by anemometer.

* *Rainfall* (continuous) by Beckley Gauge.

——————— Daily amount by Check Gauge.

Weather. 5 observations daily, and general in the interval between successive observations, also special remarks when necessary.

Cloud. 5 observations daily of "form" and "amount."

Some reduction in the number of eye observations under all these heads is made on Sundays and holidays.

Sunshine. Continuous, by the Sunshine Recorder, and weekly tabulations.

Electrograms. Continuous.

An annual inspection of the self-recording Meteorological observatories is made by the Kew staff, and occasional visits in case of breakdowns. Travelling expenses, including personal subsistence allowance, are paid by the Meteorological Office. Special investigations or observations are undertaken at Kew at the request of the Meteorological Council, on terms mutually agreed to in each case.

The meteorological instruments at Kew, and, *with some exceptions*, the apparatus for observations of Atmospheric Electricity, should be regarded as having been the property of the

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* The curves obtained by the self-registering instruments indicated by the asterisks in the above list are measured and tabulated for each hour, and in the case of the first two, the daily maximum and minimum values and times of occurrence are given.

In the case of the first four, subsidiary hourly tabulations are made.

Meteorological Office, but permanently placed at the disposal of the Kew Observatory.

During the last five years the average time occupied yearly by the Kew staff in the inspection of observatories and anemograph stations has been as follows :—

Superintendent ...	...	...	= 1 day.
2 Assistants (together) ...	...		= 50 days.

R. STRACHEY,
Chairman of Meteorological Council.

(2.)

National Physical Laboratory,
Kew Observatory, Richmond, Surrey,
February 3rd, 1900.

DEAR MR. SCOTT,

Your letter and memorandum were laid before the Committee at their last meeting and I enclose copy of the minute. I trust that the proviso is clear to you and will not give rise to any difficulty. It was thought that the words on page 2 might give the Committee a claim to practically the whole time of an assistant for special inspection work. We knew that this had not been the practice and it appeared clear from page 4 that it was not intended to make it the practice in the future, but the Committee thought it right that a proviso of the kind in the minute should be expressed.

Yours truly,
R. T. GLAZEBROOK.

MINUTE AS TO WORK FOR METEOROLOGICAL COUNCIL.

A letter from the Secretary of the Meteorological Council dated 24th January, 1900, stating that "with the concurrence of the Treasury the Meteorological Council will continue to pay quarterly from the Parliamentary grant made to the Council the sum of £100 for the services rendered to the Meteorological Office by the Kew Observatory," and enclosing a memorandum signed by the chairman of the Council which had been accepted by the Kew Committee as a correct statement of the relations now existing between the Kew Observatory Committee and the Council, was laid before the Committee.

It was agreed to accept the terms in the memorandum as those on which the National Physical Laboratory should continue to carry out work for the Meteorological Council with the proviso that the words on page 2 of the memorandum "On condition that a qualified assistant be kept at the Observatory ready to be sent wherever his services may from time to time be required" are to be interpreted in the light of the words on page 4, which provide for "occasional visits" by the members of the Kew staff "in case of breakdowns."

(3.)

Meteorological Office,
1st March 1900.

SIR,

I AM directed by the Meteorological Council to acknowledge the receipt of your letter of 3rd February 1900, enclosing a minute of the Committee of the National Physical Laboratory with reference to the continuation of the arrangement between the Council and the Kew Observatory.

The Council have no desire to vary the practice that has hitherto obtained with regard to the employment of Kew assistants by the Meteorological Office, and they are, therefore, prepared generally to interpret the condition expressed in the resolution of 1876 (set forth in the Memorandum which forms the subject of your letter) in the light of the words of page 4 of the Memorandum. But the Council think it desirable, in order to avoid any uncertainty as to the circumstances to be regarded as constituting a "breakdown," that the text of the resolution should be held to cover any cases of emergency which require such skilled assistance as the Kew Observatory has been in the habit of supplying.

I am, &c.,
W. N. SHAW, Secretary.

The Director, National Physical Laboratory.

APPENDIX III.

FURTHER CORRESPONDENCE RELATING to the MAINTENANCE of the BEN NEVIS OBSERVATORIES.

1. From the Right Hon. R. W. HANBURY, M.P., Secretary of the Treasury, to the Meteorological Council.

Treasury Chambers,
25th July, 1899.

GENTLEMEN,

I AM directed by the Lords Commissioners of Her Majesty's Treasury to transmit herewith, for your information, a copy of a letter from the Scottish Meteorological Society, dated 15th instant, and of their Lordships' reply thereto, of this day's date, on the subject of the grant of further assistance from public funds to the Ben Nevis Observatories.

I am, &c.,
R. W. HANBURY.

The Meteorological Council,
63, Victoria Street. S.W.

2. From SIR ARTHUR MITCHELL, K.C.B., M.D., Honorary Secretary of the Scottish Meteorological Society, to the Secretary of the Treasury.

Scottish Meteorological Society,
122, George Street, Edinburgh,
15th July, 1899.

SIR,

It seems to the directors of the Ben Nevis Observatories that the concluding words of the second paragraph of your letter of 19th April, 1899, to the Meteorological Council—a copy of which was sent to the Directors, and a copy of which is appended —"assuming the Parliamentary grant of £15,300 not to be increased"—indicate the possibility of such an increase being obtained, and I am instructed to say that the Directors sincerely hope that the increase will be made, in order that the work of the two Ben Nevis Observatories may be continued.

(1). In expressing this hope, I am to remind you that the Directors specially desire to continue the observations in their present form for other two years, and to say that, as the assistance now given by the Meteorological Council is promised for two years, a sum of £500 will be sufficient, and will be required, for the first year and a like sum for the second.

(2.) It is, perhaps, desirable to inform you that the Royal Society of Edinburgh have applied to the Royal Society of London for assistance in the publication of the Ben Nevis observations from January 1888 to December 1901, and that a sum of £500, corresponding to the half of the whole estimated cost, has been promised. The two Royal Societies, therefore,

have agreed to bear equally between them the cost of the second, third, and fourth volumes containing the observations, as we hope, down to the end of 1901. The cost of the first volume, a copy of which is forwarded to you, containing the observations from December 1883 to December 1887, was wholly borne by the Royal Society of Edinburgh.

The publication of the observations for the whole period, that is, from 1883 to 1901, will thus be accomplished without aid from the State.

(3.) The contributions from the public towards the establishment and carrying on of the observatories from 1883 down to June of this year have been £15,180; and the contributions during the same period from the Meteorological Council, which may be regarded as State aid, amount to £3,900, making the whole expenditure on the construction and working of the two observatories £19,080.

(4.) I am further to state that the Directors will not be able without State aid to go on with the work of the observatories after October, and that they require soon to know whether such aid is to be given, because the provisioning of the high level station must begin in the month of August. In view of this circumstance, the Directors hope that they will receive an early answer.

I am, &c.,

ARTHUR MITCHELL.

To the Secretary of the Treasury.

3. Reply from the Right Hon. R. W. HANBURY, M.P., Secretary of the Treasury, to SIR ARTHUR MITCHELL.

Treasury Chambers,

25th July, 1899.

SIR,

I HAVE laid before the Lords Commissioners of Her Majesty's Treasury your letter of the 15th instant, by which, on the behalf of the Directors of the Ben Nevis Observatories, you apply for further assistance to those institutions from public funds, and I am instructed by their Lordships to reply as follows to that letter :—

My Lords are not competent to form an opinion as to the scientific value of the work carried on at the observatories, whether taken by itself, or in relation to other branches of meteorological research, and they desire to guard themselves against the supposition that they have any views on the subject.

Looking at the matter from a more general point of view, my Lords are satisfied that it would be inexpedient to depart from the present well-established practice under which State aid to the study of meteorology is given solely through the medium of the Meteorological Council, a representative body of experts selected and designated for this purpose, and including, as you are aware, an eminent member of the Scottish Meteorological Society.

Neither are they prepared to depart from the rule under which that Council is allowed to spend in its own way the funds assigned to it, without interference from Government.

My Lords have received no such evidence as to the insufficiency of the total amount of the grant placed annually at the disposal of the Council as would warrant them in applying to Parliament for an increase in it; and they can hold out no hopes of any such application being made.

It follows from what has been said that my Lords regret that it is their duty to return an unfavourable answer to your application for a special grant towards the branch of meteorological inquiry on behalf of which you appeal.

I am, &c.,

R. W. HANBURY.

Sir Arthur Mitchell, K.C.B., etc., etc.,
Scottish Meteorological Society,
122, George Street, Edinburgh.

4. From SIR ARTHUR MITCHELL, K.C.B. to the Meteorological Council.

Scottish Meteorological Society, Edinburgh,
September 12, 1899.

DEAR SIR,

I AM instructed by the Directors of the Ben Nevis Observatories to inform you that they have received from Mr. Mackay Bernard, of Dunsinnan, a second donation of £500. This will enable them to carry on the two observatories for a year.

Yours faithfully,

ARTHUR MITCHELL.

R. H. Scott, Esq.,
Secretary, Meteorological Council.

APPENDIX IV.

List of Captains and Officers who have sent in Logs classed as "Excellent" during the year ending March 31, 1900. Figures are attached to the name of each observer to show the number of "Excellent" logs which he has supplied during the whole time of his co-operation with the Office.

Name of Captain or Officer.	Number of "Excellent" Logs.	Ship.
Achard, E. C. S.	1	Loch Finlas.
Alford, F.	7	S.S. Monarch.
Alsop, J. J.	2	Hermione.
Angus, T. S.	20	S.S. Britannia.
Bertie, J. L.	3	S.S. American.
Bolton, S. H.	23	S.S. Britannic.
Bright, H.	13	Hornby Castle.
Clarke, W. H.	4	S.S. Tauric.
Clinock, T. C.	3	S.S. Harlech Castle.
Crewe, E.	5	S.S. Victoria.
Crowley, C.	11	Verajean.
Cust, Comr. H. E. P., R.N. ...	5	H.M.S. Rambler.
Davies, H.	3	S.S. La Plata.
Dawson, W. P., R.N.	5	H.M.S. Waterwitch.
De la Garde, P., R.N. (Assistant Paymaster).	5	H.M.S. Waterwitch.
Docherty, H.	9	Barque Tinto Hill.
Duguid, W.	2	S.S. Prome.
Dupen, P. P.	14	S.S. Biafra and S.S. Jebba.
Dyke, H. W.	14	Rathdown.
Elliott, G.	1	S.S. Breconshire.
Field, A. M., R.N.	29	H.M.S. Penguin.
Fisher, R. J.	1	S.S. Mayfield.
Gifford, H. C.	4	S.S. Amber.
Haddock, H. J., R.N.R. ...	2	S.S. Britannic.
Hayes, B. F., R.N.R.	1	S.S. Britannic.
Hepworth, M. W. C., R.N.R. ...	18	S.S. Aorangi.
James, E. Gates, R.N.R. ...	2	Airlie.
Lawrence, Sub-Lt. H. J. G., R.N.	2	H.M.S. Rambler.
Lobb, Comr. F. J., R.N. ...	6	L.H. Tender Richmond.
Lowe, J.	3	S.S. Duffield.
McAllister, W.	2	S.S. Clan Ferguson.
Macdonald, J.	2	Barque Marion Fraser.
MacKay, H., R.N.R.	3	S.S. Lucania.
Millican, J. W.	18	S.S Loughrigg Holme.
Milner, W. H.	32	S.S. Atrato and S.S. Tagus.
Mitchell, G.	6	S.S. California.

Name of Captain or Officer.	Number of "Excellent" Logs.	Ship.
Moseley, F. J., R.N.R.... ...	2	S.S. Goorkha.
Mullan, F. C.	6	S.S. Reynolds.
Murdoch, P.	19	Sierra Lucena.
Norman, F.	12	S.S. Indravelli.
Peebles, R.	25	S.S. Breconshire and S.S. Lincolnshire.
Philip, W., Junr.	4	S.S. Thermopylae.
Reynolds, R., R.N.R.	3	S.S. Norman.
Scott, G. P., F.R.Met.Soc. ...	17	Buckingham.
Seymour, F. H....	2	S.S. Britannia.
Simpson, A.	29	S.S. Moravian.
Smyth, M. H., R.N.	12	H.M.S. Egeria.
Squares De Carteret, W.G., F.R. Met.Soc.	9	S.S. Minia.
Turner, A. C., R.N.R.	6	S.S. Britannia.
Tyson, J.	3	S.S. Moor.
Veale, E. A., R.N.R.	4	S.S. Ormuz.
Walker, H., R.N.R.	23	S.S. Campania.
Watson, Lieut. H. C., R.N. ..	9	H.M.S. Egeria.
Wilson, J., R.N.R.	19	S.S. Anchoria.
Worcester, W. D. G., R.N.R. ...	13	S.S. India.

APPENDIX V.

LIST of METEOROLOGICAL LOGS and DOCUMENTS received from SHIPS.

Captain's Name.	Ship.	Voyage.	Year.	Officers who have assisted in keeping the Meteorological Log.
Achard, E. C. S. ...	Ship Loch Finlas ...	Rio de Janeiro, Newcastle (N.S.W.) and New Caledonia.	1898–99	John Gregory.
Adams, William ...	S.S. Diana	Davis Straits	1899	
Alford, Francis... ...	S.S. Monarch ...	Off Coasts of British Islands	1899–1900	W. C. Hart, A. Broadbridge, and H. F. Bourdeaux.
Alsop, J. J.	Ship Hermione ...	New Zealand...	1899–1900	
Angus, T. S.	S.S. Britannia ...	Sydney, viâ Suez	1898–99	E. P. Stroud, 3rd Officer, S. Bedwell, 4th Officer, E. R. Collyer, 5th Officer.
Barker, D. Wilson, R.N.R.	Training Ship Worcester.	Off Greenhithe	1899	The Cadets.
Barr, John	S.S. Falls of Keltie ...	New York, St. Vincent, Cape Town, Newcastle (N.S.W.), Java, and Calcutta.	1898–99	W. S. Ralph, Chief Officer.
Bertie, J. L.	S.S. American ...	New York	1899	E. E. Drakeford, 2nd Officer.
„ „	„ ...	New Orleans and New York	1899	E. E. Drakeford, J. Dixon, and C. B. Harman, 2nd, 3rd, and 4th Officers.
„ „	S.S. European ...	New York	1899	W. J. Brysson, A. C. Broadbridge, A. W. Melling.
Bolton, S. H.	S.S. Britannic ...	Cronstadt	1899	A. Wrangham, Chief Officer.
Bright, H.	Ship Hornby Castle...	Adelaide	1898–99	Messrs. Gordon and Thomas, 1st and 2nd Officers.
Cameron, J. G., R.N.R.	S.S. Teutonic... ...	New York	1898	
Campbell, —	Barque Drumalis ...	San Francisco	1897	
Carey, F.	S.S. Lake Ontario ..	Quebec	1898–99	
Chamberlin, W. C. ...	Ship Narcissus ...	Albany	1899	
„ „ ...	Ship Poseidon ...	Honolulu	1899	

Clarke, W. H.	S.S. Taurio	New York	1899	A. Holme, 2nd Officer, assisted by Messrs. Freeman and Lewis, 3rd and 4th Officers.
„ „	„	„	1899–1900	Robert Learmouth, 2nd Officer, P. Leight, John Stivey, and E. Cleaves.
Clinock, T. C.	S.S. Harlech Castle ...	Cape Ports and Mauritius	1898–99	J. Cruise, E. J. Holl, E. Holm[illegible] and E. Hughes.
Constantine, T.... ...	R.M.S. Medway ...	West Indies	1898–99	C. H. Weddall, 5th Officer.
Corner, F. W., R.N.R. ...	Ship Macquarie ...	Sydney	1898–99	F. Groves, Chief Officer.
Crewe, E.	S.S. Victoria	Sydney, viâ Suez	1899	E. Smith, C. E. I A. R. Wearn.
„ „	„	„ „	1899	E.] , C. G. Smith, 2 3rd Officer, I 3rd Officer, I fficer, C. L. Martin, 5th Officer.
„ „	„	„ „	1899–1900	E. E. C. Roberts, R.N.R., Chief Officer, rary 2nd fficer, floer,
Crowley, C.	Ship Verajean ..	Nagasaki	1898-99	W and V. R. O'Reilly, 2nd Officer.
„ „	„ ...	Nagasaki and Newcastle (N.S.W.) ...	1899	Do. do.
Cust, Commander H.E.P., R.N.	H.M.S. Rambler ...	Labrador, Straits of Belle Isle, Halifax, Bermuda, Sierra Leone, Fernando Po.	1898–99	Sub-Lieut. H. J. G. Laurence, R.N.
„ „	„ ...	Fernando Po, St. Paul de Loanda, Ascension, and Congo River.	1899	Do. do.
Davidson, J. S.	Ship Celticburn ...	New York and Melbourne	1898–99	
Davies, Herbert ...	S.S. La Plata... ...	East Coast of S. America	1898–99	P. Cochrane, 2nd Officer, T. S. Blay, 3rd Officer, C. W. Stevens, 4th Officer.
„ „ ...	R.M.S. Medway ...	West Indies	1899	A Smith, 2nd Officer, J. Gair, 3rd Officer, J. P. Band, 4th Officer, — Lindsey, 5th Officer.

LIST of METEOROLOGICAL LOGS and DOCUMENTS received from SHIPS—*continued.*

Captain's Name.	Ship.	Voyage.	Year.	Officers who have assisted in keeping the Meteorological Log.
Davies, J. A.	S.S. Oanfa	China and Japan, viâ Suez	1899	Frank M. Turner.
" "	"	" viâ Suez	1899	Do. 3rd Officer.
Dawson, W.P., R.N. ...	H.M.S. Waterwitch ...	At China Station	1898	P. de la Garde, Assistant Paymaster, and J. Taylor. J. R. Bowering, P.O.'s 1st class, A. King, G. Britton, P.O.'s 2nd class.
" " ...	" " ...	" "	1899	P. de la Garde, Assistant Paymaster, and J. R. Bowering, A. King, P.O.'s 1st class, G. Britton, F. J. Canaway, P.O.'s 2nd class.
Dickinson, L. R. ...	R.M.S. Danube ...	River Plate	1898–99	J. P. Band, H. W. Turner, H J. Bennett. C. A. Young.
" " ...	" ...	"	1899	H. J. Bennett. 3rd Officer, C. A. Young, 4th Officer, H. W. Turner, 5th Officer.
Docherty, Hugh ...	Barque Tinto Hill ...	Monte Video, Adelaide, and Melbourne ...	1898–99	Mr. Masson, 2nd Officer.
Duguid, William ...	S.S. Prome	Rangoon, viâ Suez	1899	
" " ...	"	" "	1899–1900	Mr. Taylor, 3rd Officer, and Mr. Guthrie, 2nd Officer.
Dupen, P. P.	S.S. Biafra	West Coast of Africa	1899	J. M. Draper, 2nd Officer, and O. D. Greaves, 3rd Officer.
" "	S.S. Jebba	" "	1899	Do. do.
" "	" ...	" "	1899–1900	Do. do.
Dyke, H. W.	Ship Rathdown ...	Port Royal, U.S.. Yokohama, and New York.	1898-99	Mr. Hall, Chief Officer.
Elliott, G.	S.S. Breconshire ...	Kilindini (E. A.), and Karachi, via Suez ..	1899	Messrs. Matthews and Owens.
Ellis, J. D.	Ship Eulomene ...	Newcastle (N.S.W.), San Francisco, and Portland (Oregon).	1897–98	W. A. R. Allan.
Elmes, J.	S.S. Glencoe	Norfolk, Va.	1898-99	

Field, A. M., R.N. ...	H.M.S. Penguin ...	South Pacific and Sydney	1898-99	
Fisher, R. J.	S.S. Mayfield ...	Barcelona, Carthagena, and Cronstadt ...	1898–99	D. McDonald, Chief Officer, E. A. Olzen, R. L. Mackie, J. W. Kitwood, 2nd Officers.
Ford, M....	S.S. Tekoa	Wellington, viâ Cape Good Hope, and Monte Video.	1899–1900	
French, A. L.	S.S. Lumen	Philadelphia	1899–1900	F. A. White, 1st Officer.
Gedge, Com. H. J., R.N.	H.M.S. Stork... ...	Malta, Alexandria and Red Sea	1898–99	Lieut. H. P. Douglas, R.N.
Gifford, H. C.	S.S. Amber	Cape Town and West Coast of Africa ...	1899	Gilbert C. Hogg, Chief Officer, D. P. Morrell, 2nd Officer, W. F. R. Mist, 3rd Officer, G. C. Napier, 4th Officer.
„ „	„	On West Coast of Africa	1899	Do. do.
„ „	„	West Coast of Africa	1899	Do. do.
Glegg, Robert	S.S. Macduff	China, Japan, and New York, viâ Suez...	1899	Robert Logan, 2nd Officer.
Haddock, H. J., R.N.R.	S.S. Britannic ...	New York	1899	G. R. Metcalfe, 2nd Officer, assisted by S. S. Cannauton, 3rd Officer, J. B. Bulman, 4th Officer.
Hamon, J. J.	S.S. Waimate... ...	New Zealand, viâ Cape Good Hope, and home, viâ Cape Horn.	1899	Messrs. Burrill, Nye, and Porter, 2nd, 3rd, and 4th Officers.
Hay, C. W.	R.M.S. Warrimoo ...	Sydney, Wellington, Suva, Honolulu, and Vancouver.	1898–99	G. Hammon, W. Ellis, and J. Heron, 2nd, 3rd, and 4th Officers.
„ „	„ „ ...	Brisbane and Victoria (B.C.)	1899–1900	W. Bishop, 3rd Officer.
Hayes, B. F., R.N.R. ...	S.S. Britannic ...	New York	1899	G. R. Metcalfe, 2nd Officer, assisted by S. S. Cannauton, 3rd Officer, J. B. Bulman, 4th Officer.
Hemming, F. A. ...	R.M.S. Miowera ...	Sydney, Wellington, Suva, Honolulu, and Vancouver.	1898	
Hepworth, M. W. C., R.N.R.	R.M.S. Aorangi ...	Vancouver, Honolulu, Suva, Wellington, and Sydney.	1898-99	S. Phillips, Chief Officer, R. M. Reader, 2nd Officer, F. G. Bayldon, 3rd Officer, R. Bailey, 4th Officer.

LIST of METEOROLOGICAL LOGS and DOCUMENTS received from SHIPS—*continued.*

Captain's Name.	Ship.	Voyage.	Year.	Officers who have assisted in keeping the Meteorological Log.
James, E. G.	Ship Airlie	Algoa Bay, Newcastle (N.S.W.), Valparaiso	1898–99	H. F. B. Gape, 1st Officer, and F. R. Bishop, 2nd Officer.
Jarvis, W.	S.S. Den of Airlie ...	Bombay, viâ Suez	1898–99	Alexander Hunter.
Johnston, T., R.N.R. ...	S.S. Goorkha	Calcutta, viâ Suez	1899	H. J. Brooks, J. Middleton, L. G. Spurrett, and A. Darling.
Jones, John	Ship Travancore ...	Table Bay and Adelaide	1898–99	
Jones, R. O.	S.S. Vancouver ...	Montreal	1898–99	John Davies.
Jones, T. G., R.N.R. ...	S.S. Bovic	New York	1898–99	W. D. Moloney, L. M. Davies, T. M. Winslow.
Kelly, R.	Ship Westland ...	New Zealand...	1898–99	J. Samuels, 1st Officer, assisted by R. Nellist, 3rd Officer.
Kempson, C. H. ...	S.S. Ionic	Cape Town, Wellington, and Rio de Janeiro.	1899	Mr. Moloney and Mr. Lewis.
" " ...	"	" " "	1899	E. O. Kemp, 3rd Officer, Patrick Moloney, 4th Officer.
Leigh, T.	S.S. India	Sydney, viâ Suez	1899	G. ıd Officer, assisted f Officer, C. W. ır, E. M. Hussey- V. L. Trumper, 4th Officer, and P. S. Bateman.
Lindquister, A.	S.S. Britannia ..	Bombay, viâ Suez	1899	R. A. Browne, 2nd Officer.
Livett, H.	S.S. Ormuz	Sydney	1899–1900	P. N. Layton, H. R. Leslie, and T. S. Monteith.
Lobb, F. J., R.N. ...	Lighthouse Tender Richmond.	Bermuda and Bahamas	1898–99	F. W. Holden.
Lowe, J.	S.S. Duffield	Baltimore, Batoum, and Philadelphia ...	1898–99	F. A. White, Chief Officer.
McAllister, W.	S.S. Clan Ferguson ...	Calcutta, viâ Suez	1899	C. Joel Higgins, 2nd Officer.
" "	" " ...	" "	1899–1900	Do. do.

McCracken, J.	Barque Lord Templetown.	San Francisco and Iquique	1898–99	M. Loverock, 3rd Officer.
MacDonald, John ...	Barque Marion Fraser	Sydney, Newcastle (N.S.W.), and Iquique	1898–99	George Clark, 3rd Officer.
McKay, Horatio, R.N.R.	S.S. Lucania	New York	1898–99	A. H. Reade, R.N.R.
" " "	"	"	1899–1900	
Martin, T. C.	Barque Loch Tay ...	Melbourne	1899	
Miller, A. T., R.N. ...	School Ship Conway	Off Rock Ferry, Birkenhead	1899	The Cadets.
Millican, J. W.	S.S. Loughrigg Holme	Savannah, Bremen, Charlestown, Leghorn, and Louisburg.	1898–99	D. S. Turney, W. S. Hodgson, and F. A. Little.
" " ...	" "	Quebec	1899	F. A. Little, Chief Officer, and W. S. Hodgson, Second Officer.
Milne, W. F.	S.S. Eclipse	Davis Straits...	1899	
Milner, W. H.	S.S. Atrato	West Indies	1899	S. N. Braithwaite.
" "	"	"	1899	Stanley Braithwaite, 5th Officer.
" "	S.S. Tagus	" and Colon	1899–1900	H. B. Popplewell, 4th Officer.
Mitchell, George ...	S.S. California ...	Mediterranean Ports and New York ...	1898–99	Malcolm McNeil.
" " ...	" ...	New York and Mediterranean Ports ...	1899	Messrs. McNeil and Mellwraith.
Morrison, G.	Ship Celtic Monarch	Yokohama, Seattle, and home	1898–99	W. H. Lloyd. 3rd Officer.
Moseley, F. J., R.N.R....	S.S. Goorkha... ...	Cape Town	1899	Travers, R., 2nd Officer,
" " " ...	"	"	1899–1900	f. Betts, R.N.R., .R., 4th Officer.
Mullan, F. C.	S.S. Reynolds ...	Port Said, Batoum, Bombay, viâ Suez ...	1898–99	W. H. Davis, W. H. Knox, and P. H. Hore.
" "	" ...	Novorossisk, Colombo, Vladivostock, and Singapore.	1899	W. H. Davis, Officer, W. H. Knox, 2nd Officer, I. Strathern, 3rd Officer.
" "	" ...	Port Said and Baltimore	1899–1900	W. H. Davis, W. H. Knox, and I. Strathern.
Murdoch, Peter... ...	Ship Sierra Lucena ...	Cape Town and Rangoon	1898–99	E. Maycock, Apprentice.
Nasbet, I. R., R.N.R. ...	S.S. Sabine Rickmers	In China Sea...	1899	Thomas Powell and A. Dransfield.
" " " ...	" "	" "	1899	Do. do.

LIST of METEOROLOGICAL LOGS and DOCUMENTS received from SHIPS—*continued.*

Captain's Name.				Officers who have assisted in keeping the Meteorological Log.
Norman, F. ...				. L. Fletcher and D. Mansfield, Midshipmen.
Parry, J. F., R.N.				lbert O. Bobardt, Surgeon, assisted by Lieutenants May, Stalmer, and Petty Officers.
Pattman, R. ...				lessrs. Valentine and King, 1st and 2nd Officers.
Pearce, T. R.	S.S. Severn	East Coast of South America	1898–99	A. Sampson, F. Sweeting, and G. Hillier.
" "	"	West Indies and River Plate	1899	A. Sampson, 2nd Officer, F. Sweeting, 3rd Officer, M. Watkins, 4th Officer.
Peebles, Robert ...	S.S. Breconshire ...	Kilindini (E. A.) and Karachi, viâ Suez...	1899	Messrs. Elliott, Matthews, and Owens.
" " ...	S.S. Lincolnshire ...	" " " ...	1899	A Mell and H Pritchard.
Philip, W., Junr. ...	S.S. Thermopylæ ...	Sydney, viâ Cape Town "	1899	W. Douglas, W. M. Jermyn, and E. Legge, 1st, 2nd, and 3rd Officers.
Phillips, J. D. S. ...	R.M.S. Warrimoo ...	Brisbane and Victoria (B.C.)	1899-1900	W Bishop, 3rd Officer.
Potter, R. H.	Barque Alliance ...	Brisbane ... ... " " ...	1898–99	R. O. Harris and W. Griffiths, 1st and 2nd Officers.
Pritchard, A. T., R.N.R.	R.M.S. Cuzco ...	Sydney, viâ Suez	1898–99	ief Officer, J. F. r, H. Stanston, 3rd th Officer.
	S.S. Orient	" "	1899	
Pybus, H., R.N.R. " ...	S.S. Tartar	Nagasaki and San Francisco	1899	
Reeves, Isaac	S.S. Australia ...	Sydney, viâ Suez	1899	Ernest G. H. Brady.
" "	" ...	" "	1899	Do.
Reynolds, R., R.N.R. ...	S.S. Norman	Cape Town	1899	J. V. Williams, 1st Officer, H. D. Watts-Russell, 2nd Officer, T. A. Jones, 3rd Officer, D. E. Easton, 4th Officer.

Robinson, E. R., R.N.R.	S.S. Goorkha... ...	Calcutta, viâ Suez	1899	John Ross, Chief Officer, L. G. Spurrett, 2nd Officer, T. S. Thompson, 3rd Officer, John Coney, 4th Officer.
,, ,, ,,	,, ...	,, ,, ...	1899–1900	J. A. Ross, Chief Officer, J. Middleton, 2nd Officer, and L. Spurrett, 3rd Officer.
Rohde, H.	Ship King Edward ...	Batavia and Yokohama	1898	
,, ,, ...	,, ,, ...	Yokohama and Tacoma	1898–99	
Scott, G. P., F.R. Met. Soc.	Ship Buckingham ..	Tacoma and Rio Janeiro	1898–99	W. Bourke, Chief Officer, and J. Mawdesly, 2nd Officer.
,, ,, ,,	,, ,, ...	Calcutta	1899	W. Calvert, 1st Officer, W. Cooker, 2nd Officer.
Seymour, F. H. ...	S.S. Britannia ...	Sydney, viâ Suez	1899	J. W. Ireland, Sup. 2nd Officer, assisted by R. P. Stevenson, 2nd Officer, and W. Lake, 5th Officer.
,, ,, ...	,, ...	.. ,, ...	1899	R. Stevenson, 2nd Officer, E. B. White, 3rd Officer, L. Bedwell, 4th Officer, R. Collier, 5th Officer.
Shepherd, D.	Ship Frankistan ...	San Francisco, Calcutta, New York, Yokohama, and Tacoma.	1896–99	Messrs. F. Jackson, Rowland, and Sellars.
Simpson, Alexander ...	S.S. Moravian ...	Melbourne, viâ Cape Town	1899	H. W. Schleman, Chief Officer, George Elrick, 2nd Officer, D. M. Ross, Aux. 2nd Officer.
,, ,, ...	,, ...	,, ,, ...	1899	
Sinclair, William ...	Barque Cupica ...	New Zealand	1899	
Singer, P.	S.S. Den of Airlie ...	Bombay, viâ Suez	1898	Alexander Hunter.
Smith, A. H.	Barque Cape Clear ...	San Francisco	1898–99	Robert Boyd and V. Jorgensen.
Smyth, Comr. M. H., R.N.	H.M.S. Egeria ...	At Vancouver	1898–99	Lieut. H. C. Watson, R.N., and Quartermasters.
,, ,,	,, ...	,, ...	1899	Do. do.
,, ,,	,, ...	Honolulu and Esquimalt	1899	Do. do.
,, ,,	,, ...	Esquimalt, San Francisco, and Honolulu	1899	Do. do.

LIST of METEOROLOGICAL LOGS and DOCUMENTS received from SHIPS—*continued.*

Captain's Name.	Ship.	Voyage.	Year.	Officers who have assisted in keeping the Meteorological Log.
Squarea De Carteret, W. G., F.R.Met.Soc.	S.S. Minia	East Coast of North America and North Atlantic.	1899	James Adams. Chief (Williams, 2nd Officer. T. R. Applegate, Junr., 2nd Officers, J. E. Jeffries, 3rd Officer.
Suffern, R.	Barque Craigerne ...	Hong Kong, Batavia, and New Caledonia	1898–99	R. Gregson, 1st Officer, and C. Waring, 2nd Officer.
Trenaman, R. W. ...	S.S. Romney	Monte Video	1899	Alfred Gittins, 2nd Officer.
" " ...	"	River Plate	1899	A. Gittins.
" " ...	"	Monte Video	1899–1900	Do.
Turner, A. C., R.N.R. ...	S.S. Britannia ...	Bombay, viâ Suez	1899	R. A. Browne, 2nd Officer.
" " " ...	" ...	" "	1899	James Young, 2nd Officer.
" " " ...	" ...	" "	1899–1900	Robert A. Brown, 2nd Officer.
Tyson, John	S.S. Moor	Cape Town	1899	W[illegible]. H. B. Rake, 3rd [illegible]e, 4th Officer.
" "	"	"	1899	—[illegible]. — Sweeney, 2nd Officer, H. B. Rake, 3rd Officer, H. B. Harvey, 4th Officer.
Veale, E. A., R.N.R. ...	R.M.S. Ormuz ...	Sydney, viâ Suez	1899	
" " " ...	" ...	" "	1899	H. R. Leeslie.
Wadsworth, F. H. ...	S.S. Ethiopia... ...	New York	1898–99	
" " ...	" ...	"	1899	
" " ...	" ...	"	1899–1900	
Walker, H. ...	S.S. Campania ...	"	1898–99	C. A. Smith. R.N.R., assisted by W. Hankinson, H. Nelson, and R. Capper.

Watt, A.	Barque Iranian ...	New York, Hong Kong, and Vancouver ..	1898–99	
Williamson, J. C. ...	S.S. Lennox	China and Japan, viâ Suez, New York, Honolulu, Portland (Oregon).	1898–99	I. Wallace, 3rd Officer, assisted by I. Thomson, 2nd Officer.
Wilson, John, R.N.R. ...	S.S. Anchoria ...	New York	1899	Graham P. M. Robb, 3rd Officer.
" " " ...	" ...	"	1899–1900	John Duncan, 3rd Officer.
Wood, G. H. B.... " ...	Ship Soukar	Mauritius and Dunedin	1898–99	
Woodward, E. A. ...	Barque Cambrian ...	Sydney	1899	G. A. Rae and S. Spearpoint.
Worcester, W. D. G., R.N.R.	S.S. India	Sydney, viâ Suez	1899	C. J. Benton, Chief Officer, B. Bartlett, 2nd Officer, G. C. Holloway, Sup. 2nd Officer, L. M. Gordon, 3rd Officer, V. Trumper, 4th Officer, P. S. Bateman, 5th Officer.
" "	"	Colombo and Australia, viâ Suez... ...	1899–1900	G. C. Holloway, Sup. 2nd Officer, assisted by C. Benton. Chief Officer, C. W. Burleigh, 2nd Officer, E. M. Hussey-Cooper, 3rd Officer, V. L. Trumper, 4th Officer, and H. Monro, 5th Officer.
Young, H.	S.S. Ethiopia... ...	New York	1899–1900	

APPENDIX VI.

INSTRUMENTS supplied, &c., to the Royal Navy.

Per Account.	Barometers.	Aneroids.	Thermometers.				Hydrometers.
			Ordinary.	Max.	Min.	Screens.	
April 1st. 1899. afloat ...	235	634	1,391	415	403	233	45
Issued since	119	228	425	101	98	40	38
	354	862	1,816	516	501	273	83
Returned since	115	188	416	89	83	35	26
April 1st, 1900, afloat ..	239	674	1,400	427	418	238	57

INSTRUMENTS supplied, &c., for use at Naval Stations.

April 1st, 1899, in use ...	75	83	252	34	54	10	11
Issued since	1	7	44	—	2	—	—
	76	90	296	34	56	10	11
Returned since	1	7	47	1	1	—	—
April 1st, 1900, in use ...	75	83	249	33	55	10	11

DISPOSITION of ADMIRALTY INSTRUMENTS on April 1st, 1900.

Afloat in Royal Navy ...	239	674	1,400	427	418	238	57
In use at stations	75	83	249	33	55	10	11
In store at M.O.	32	163	86	100	107	65	29
„ Chatham	20	41	137	46	45	19	12
„ Sheerness ...	4	11	17	6	6	8	6
„ Portsmouth ...	24	55	158	52	58	24	4
„ Devonport ...	22	43	136	38	40	21	2
„ Queenstown ...	2	3	10	3	3	—	—
„ Gibraltar	2	3	10	3	3	—	4
„ Malta	13	13	76	11	9	2	6
„ Bombay	4	5	13	5	6	2	4
„ Halifax	8	5	22	4	3	2	7
„ Bermuda ...	9	11	22	4	5	3	—
„ Jamaica	4	5	16	—	1	1	3
„ Cape of Good Hope	6	6	26	7	6	2	4
„ Trincomalee ...	3	5	21	5	6	1	4
„ Hong Kong ...	14	20	33	12	13	4	23
„ Coquimbo ...	3	4	18	3	4	1	19
„ Sydney	4	6	27	5	6	2	22
„ Esquimalt ...	3	3	10	2	6	2	4
Total April 1st, 1900 ...	491	1,159	2,487	766	800	407	321
Lost, &c., since April 1st, 1899	—	5	275		35	26	17
Under repair, April 1st, 1900	48	6	3	1	—	—	—

APPENDIX VII.

INSTRUMENTS supplied, &c., to Mercantile Marine.

Per Account.	Barometers.	Compasses.	Thermometers.				Hydrometers.
			Ordinary.	Max.	Min.	Screens.	
April 1st, 1899, afloat ...	113	—	706	—	—	104	399
Issued since	36	—	258	—	—	31	136
	149	—	964	—	—	135	535
Returned since	46	—	311	—	—	37	172
April 1st, 1900, afloat ...	103	—	653	—	—	98	363

INSTRUMENTS at Stations, viz., Telegraphic Reporting Stations Observatories, Fishing Villages, &c.

April 1st, 1899, in use ...	310	2	290	61	71	58	10
Issued since	17	—	18	5	8	5	1
	327	2	308	66	79	63	11
Returned since	14	1	25	7	13	7	1
April 1st, 1900, in use ...	313*	1	283	59	66	56	10

DISPOSITION of INSTRUMENTS on April 1st, 1900.

In merchant ships	103	—	653	—	—	98	363
„ use at stations	313	1	283	59	66	56	10
„ store at M.O.	43	3	154	18	44	40	111
At Liverpool Agency ...	7	—	50	—	—	8	23
„ Glasgow „ ...	7	—	37	—	—	5	24
„ Dundee „ ...	5	—	27	—	—	4	25
„ Hull „ ...	3	—	15	—	—	3	10
„ Cardiff „ ...	10	—	40	—	—	3	34
„ Southampton „ ...	5	—	10	—	—	2	9
Total, April 1st, 1900 ...	496	4	1,269	77	110	219	609
Lost, &c., since April 1st, 1899	1	—	130	2	3	28	49
Under repair, April 1st, 1900	1	—	—	—	—	—	—

* Of these barometers, 32 are lent for use of seafaring communities at fishing villages and ports.

APPENDIX VIII.

METHOD of DEALING with TELEGRAPHIC WEATHER INTELLIGENCE.

The operations connected with the preparation and issue of the Forecasts and Storm Warnings have not undergone any material change.

Full details will be found in Appendix IX. to the Report for 1890-91.

DAILY WEATHER REPORT.

The Office now receives, when the telegraphic communications are perfect, fifty-five reports each morning, seven each afternoon (except on Sundays), and twenty-seven each evening. A reduction of the number of stations has been made after mature consideration. The reports from Ardrossan, York, Cambridge, Prawle Point, and Hurst Castle—the last two of them being adequately represented by a new station at Portland Bill—have been discontinued. Reports from additional stations are, however, received in the afternoon during the summer months, with a view to the issue of Harvest Forecasts. It is also to be noted that at 6 p.m. all the stations then send in their 2 p.m. as well as their 6 p.m. readings, so that the record for reference is almost as complete as before.

The change made in the Daily Weather Report during 1894, by the insertion of reports from the Azores (forwarded by the courtesy of the Portuguese Meteorological Authorities), is still in force. The Report fills four large quarto pages, as it has for several years past.

The standing portions (maps, &c.) are printed in blue, and the information for each day is in black.

The Monthly "Correction and Addition List" is published as before.

The subscription for the Report is—

For delivery by hand, where feasible, £2 *per annum;*
„ *by book post* £1 „

N.B.—Subscriptions are payable in advance, Annually or Quarterly; those for a Quarter end at the Official Quarter days, *e.g.*, March 31, June 30, &c.

WEEKLY WEATHER REPORT.

The Weekly Weather Report, which has appeared since February, 1878, and was re-arranged at the commencement of 1890, is prepared for the calendar week, Sunday to Saturday, and is steadily increasing in value. It is published on Thursdays, and is illustrated by three maps for each day, which, like those in the Daily Reports, show the outline of the land and surface of the sea in blue, while the daily information is in black. The maps show (1) for 8 a.m. the temperature, weather, and sea disturbance; and (2) for 8 a.m. and (3) for 6 p.m. the distribution of pressure, and the winds over and on the coasts of Europe. The information on the first and second pages

of each Report consists of observations of Temperature and Rainfall made at 73 stations, the individual values for which are given on the second page of the Report. Sunshine records taken at 62 stations are given on the second and sixth pages of each Report.

Tables of *Accumulated Temperature*, designed to give persons engaged in agriculture better means for estimating the manner in which vegetation is affected by temperature than that afforded by the more usual methods of treating the readings of the thermometer, are still published on the first and second pages, and show for each week, and for the whole period from the beginning of the year, the weekly and progressive values respectively of the combined amount and duration of the excess or defect of the air temperature, above or below a suitably fixed standard, or *base temperature*. The base value adopted is 42° Fahr.

Accumulated Temperature is expressed in *Day degrees*, a Day degree signifying 1° F. of excess or defect of temperature above or below the base (42° F.) continued for 24 hours, or any other number of degrees for an inversely proportional number of hours.

The following are the rules for computing, for a weekly period, from the observed maxima and minima, the accumulated temperature above or below 42° F. :—

1. Obtain the mean temperature, from the means of the seven observed maxima and minima, suitably corrected for non-periodic changes of temperature.

2. In obtaining the accumulated temperature four cases may occur, to which the following rules will apply :—

Conditions of Temperature.	To obtain the daily Accumulated Temperature.	
	Above 42° F.	Below 42° F.
If the minimum is *above* 42° F., or *equal* to 42° F.	Subtract 42° F. from the mean.	There is none.
If the minimum is *below* 42° F., but the mean for the day is *above* 42° F.	From the difference between the mean for the day and the minimum deduct the accumulated temperature below 42° F., calculated as stated in the next column.	The required quantity is the excess of 42° F. over the minimum, multiplied by the coefficient 0·4.
If the mean for the day is *below* 42° F., but the maximum is *above* 42° F.	The required quantity is the excess of the maximum over 42° F., multiplied by the coefficient 0·4.	From the difference between the mean for the day and the minimum deduct the accumulated temperature above 42° F., calculated as stated in the preceding column.
If the maximum is *below* 42° F., or *equal* to 42° F.	There is none.	Subtract the mean from 42° F.

In each of the above cases the result will be the average *daily* value, and must be multiplied by 7 in order to obtain the value for the whole week.

The coefficient varies with the duration of the period, and also with the base temperature.

The coefficient given in the second and third rules of the preceding table is for a weekly period, and for the base temperature 42° F. The following are its values for other base temperatures :— for 32° F., 0·4 ; for 52° F., 0·33 ; for 62° F., 0·25.*

For the preparation of the tables, in addition to the reports from the Telegraphic Reporting Stations, and the returns from certain self-recording Observatories, weekly schedules from 56 volunteer observers are used, the names of the stations and observers being given in Appendix XIII., p. 62.

An early copy of the MS. of the Report is prepared on Tuesday in each week, and the summary on its first page is sent to several papers on that evening ; the printed copies of the complete Report are ready for sale on Thursday afternoon.

Summaries and Appendices to the Weekly Weather Reports.

Two Appendices have appeared similar to those for several recent years. They comprise : I.—Summaries for the separate Quarters, and for the Year. II.—Weekly and Progressive Values of the different elements.

The *Monthly Summary Supplement* gives the average values for Pressure, Temperature, Rainfall, and Bright Sunshine of the current month, and the difference between these values and the means for the corresponding months in a long series of years, together with the number of days on which rain, snow. hail, thunder, &c., occurred, and the number of days on which the wind blew from the eight principal points of the compass, and a brief *résumé* of the principal features which have marked the weather of the month. It is illustrated by four maps, showing the distribution of the average pressure and temperature and of the rainfall for the period, and the movements of the principal depressions which have passed over the British Islands and their neighbourhood.

Issue of Forecasts.

Remarks on the actual state of the weather, and Forecasts *for not more than one day in advance*, are prepared at the Meteorological Office as under :—

On Week Days.†

(1.) At 11 a.m. (from the morning reports), for the 24 hours ending at Noon on the day following the date of issue. These are intended especially for the early editions of the evening papers, for the Clubs, and for exhibition at certain selected places (see note on page 13).

(2.) At 3.30 p.m., during the months of June, July, and August (from the morning and afternoon reports). This set of forecasts is prepared during the Harvest Season, so that they may be available for transmission by telegram to agriculturists who apply for them. They are applicable to the civil day following the time of issue.

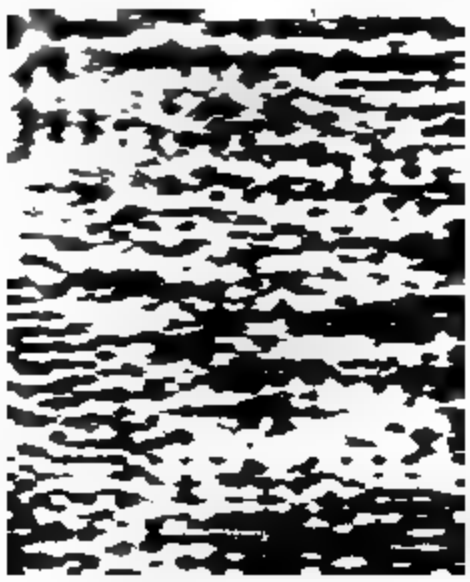
(3.) At 8 p.m. (from the 8 a.m., 2 p.m., and 6 p.m. reports), for the civil day following that of issue. These are supplied gratis to any newspaper or news agency which may apply

* A full explanation of the principles on which these rules are based will be found in Appendix II. to the Quarterly Weather Report for 1878.

† Good Friday, Christmas Day, and Bank Holidays are reckoned as Sundays.

for them, and send for them regularly. A very large number of the more important papers and news agencies avail themselves of this advantage.

The forecasts are made for the following districts :—



0. SCOTLAND, NORTH.
1. SCOTLAND, EAST.
2. ENGLAND, N.E.
3. ENGLAND, EAST.
4. MIDLAND, COUNTIES.
5. ENGLAND, SOUTH (and English Channel).
6. SCOTLAND, WEST (with Isle of Man).
7. ENGLAND, N.W. (with North Wales).
8. ENGLAND, S.W. (with South Wales).
9. IRELAND, NORTH.
10. IRELAND, SOUTH.

The remarks and forecasts are posted at the doors of the Meteorological Office, 63, Victoria Street, S.W., on week days,* for the inspection of the public. Copies or extracts from them are communicated under the conditions stated below, but no information which is not substantially included in them will be supplied.

A series of boards is exhibited on the front of the Office showing in large type the state of the wind, weather, and sea disturbance at six stations, situated on our S.E., S., and W. coasts. The stations selected are Yarmouth, Dungeness, Portland Bill, Scilly, Holyhead, and Valencia (Ireland), and the observations posted up are those for 8 a.m. and for a few stations at 2 p.m., daily, except on Sundays,* the boards being changed at about 9h. 45m. a.m. and 3h. p.m. The information can be easily read from the street.

FORECASTS FOR SUBSCRIBERS.—Any person can be supplied with a copy of the Forecasts by post, once on each week day,* on payment of a subscription of ten shillings per annum, or 2*s.* 6*d.* per official quarter, or any part thereof, *in addition to the cost of transmission;* the charges will therefore be, by *letter* post, 9*s.*, by *book* post, 5*s.* 9*d.*, per quarter.

The forecasts for any individual district and for either of the hours mentioned above can be forwarded by telegraph, on payment of 3*d.* per day, for any definite period, in addition to the cost of transmission.

FORECASTS FOR CLUBS.—These are drawn up at 11 a.m., for all the districts, and are supplied to Clubs, for a subscription of ten shillings per annum. They are delivered by hand to Clubs situated in or near Pall Mall. Special arrangements can be made for delivery at a greater distance by hand or by post.

FORECASTS FOR HAY AND CORN HARVESTS, OR FOR PUBLIC USE.—Special facilities are offered for the transmission of Forecasts for these purposes, no charge being made beyond the cost of the telegrams. These are supplied only to Agriculturists, or to persons making public use of them.

* Good Friday, Christmas Day, and Bank Holidays are reckoned as Sundays.

EXHIBITION OF TELEGRAPHIC FORECASTS AT LOCAL POST OFFICES.—The Post Office has sanctioned the exhibition of Forecasts at Local Post Offices, provided space is available, if the persons to whom they are addressed desire them to be so exhibited instead of being delivered to themselves.

Unless otherwise arranged, all forecasts transmitted by post are sent by book post, not as letters.

INQUIRIES as to the WEATHER.

INQUIRIES PERSONALLY OR BY MESSENGER.—Any person applying at the Meteorological Office between 11 a.m. and 8 p.m. on week days, and between 7 p.m. and 8 p.m. on Sundays,* can be supplied, in writing, with the latest information in the possession of the Office, with regard to the weather in any district, or the latest forecast issued for any specified district, on payment of one shilling† for each inquiry.

INQUIRIES BY LETTER.—Application may be made by letter, enclosing thirteen pence in stamps if the reply is to be *by post*, and one shilling† in stamps, *in addition to the cost of the reply* (consisting of ten words, exclusive of the address) if the reply is to be *by telegraph*.

INQUIRIES BY TELEGRAPH.—Any person may obtain *by telegraph* from the Meteorological Office the latest information as to the weather in, or the latest forecast for any district of, the United Kingdom by payment of a fee of one shilling† *in addition to the cost of a telegram and reply to any post office.* The telegram containing the inquiry must be addressed as follows :—

To

WEATHER,

LONDON.

The payment for the reply must be for at least ten words in addition to the address.

Application may also be made for similar information to be sent either *by telegraph* or *post* on any future specified day.

CHECKING OF FORECASTS and STORM WARNINGS.

The forecasts and storm warnings issued by the Office are carefully checked by being compared with the conditions actually experienced during the time to which they refer. The method adopted was fully explained in the Annual Report for 1891, and the results for 1899 will be found on pp. 13–16.

In order to render the information in the possession of the Office as to the weather experienced on our coasts still more complete, the Council have, as in preceding years, obtained from the various Lighthouse Boards the original log-books from some of the most exposed lightships and lighthouses. They again express their cordial thanks for the co-operation so readily granted to them by these Boards.

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* Good Friday, Christmas Day, and Bank Holidays are reckoned as Sundays.

† NOTE (May, 1900).—Since the close of the period to which this Report refers arrangements have been made for the reduction of the fee to sixpence (*see* p. 7).

APPENDIX IX.

REPORT ON THE COMPARISON OF THE FORECAST ISSUED AT 8h. 30m. p.m., WITH THE WEATHER SUBSEQUENTLY EXPERIENCED, for the 12 Months April 1899 to March 1900. The results are for the United Kingdom as a whole.

The letters used have the following signification :—

a=complete success.	**c**=partial failure.
b=partial (more than half) success.	**d**=total failure.

The checking has been conducted on the same system as that employed in previous years, *i.e.*, each ferecast has been considered under the separate headings of "Wind" and "Weather," but the results of the 8.30 p.m. Forecasts only are here published.

The first column gives the percentage of success in "Wind," the second in "Weather," and the third the average of the two.

The Summary for the various districts is given at page 13.

Months.		Percentages. Wind.	Weather.	Average.	a + b.
April	a	40	57	49	84
	b	36	34	35	
	c	17	7	12	
	d	7	2	4	
May	a	58	70	64	84
	b	23	16	20	
	c	16	8	12	
	d	3	6	4	
June	a	48	68	58	83
	b	31	18	25	
	c	16	5	10	
	d	5	9	7	
July	a	61	63	62	86
	b	24	23	24	
	c	10	10	10	
	d	5	4	4	
August	a	55	63	59	86
	b	26	28	27	
	c	15	5	10	
	d	4	4	4	
September	a	33	58	46	77
	b	36	27	31	
	c	24	10	17	
	d	7	5	6	
October	a	50	69	60	86
	b	31	22	26	
	c	14	3	9	
	d	5	6	5	
November	a	37	63	50	79
	b	34	23	29	
	c	20	6	13	
	d	9	8	8	
December	a	49	54	52	82
	b	28	32	30	
	c	15	8	11	
	d	8	6	7	
January	a	43	63	53	80
	b	31	22	27	
	c	19	11	15	
	d	7	4	5	
February	a	39	64	52	79
	b	31	23	27	
	c	23	7	15	
	d	7	6	6	
March	a	48	59	54	81
	b	27	28	27	
	c	17	9	13	
	d	8	4	6	
The entire year	a	47	63	55	82
	b	30	25	27	
	c	17	7	12	
	d	6	5	6	

APPENDIX X.

STORM WARNINGS.

The Meteorological Office issues notices of atmospherical disturbances on or near the coasts of the British Islands (free of charge) to ports and fishing stations recommended by responsible local authorities.

The fact that one of these notices has been received at any station is made known by hoisting a black canvas cone, 3 feet high, and 3 feet wide at base, which has the appearance of a triangle when hoisted. The telegram directing the cone to be hoisted should be exhibited near the signal staff.

At dusk, whenever a signal ought to be flying if it were daylight, a night signal, consisting of three lanterns hung on a triangular frame, may be hoisted in place of the cone.

The Meteorological Office supplies the canvas cone, but does not undertake to supply the lanterns. In all cases the local authorities must undertake the charges incidental to the hoisting of the signal, such as flagstaff and gear, oil, &c., and also as to the keeping of the apparatus in repair, painting, &c.

The following is a list of the stations to which storm-warning telegrams are sent :—

NORTHERN.	WESTERN.	SOUTHERN.	EASTERN.
SCOTLAND, N.E.	IRELAND, S.W.	ENGLAND, S.W.	ENGLAND, N.E.
Lerwick.	Tuskar L.H.	The Lizard.	Berwick-on-Tweed.
Scalloway.	New Ross.	Falmouth.	Cullercoats.
Dunrossness.	Dunmore East.	Pendennis.	Tynemouth.
Sumburgh Hd. L.H.	Dungarvan.	Mevagissey.	South Shields.
Noup Head L.H.	Minehead L.H.	Mount Batten.	Souter Point L.H.
Stromness.	Youghal.	Plymouth.	Sunderland.
Kirkwall.	Queenstown.	Devonport.	Hartlepool.
Cantick Head L.H.	Cork.	Prawle Point.	Middlesborough.
Holborn Head.	Passage.	Teignmouth.	Redcar.
Dunnet Head.	Kinsale.	Exmouth.	Whitby.
Wick.	Do. (Old Head).		Filey.
Tarbet Ness L.H.	Galley Head L.H.		Flamborough Hd.
Avoch.	Castletownshend.		Bridlington.
Inverness.	Fastnet Rock L.H.		Hull.
Nairn.	Brow Head.		Goole.
Burghead.	Tralee.		Grimsby.
Lossiemouth.	Limerick.		Boston.
Buckie.	Loophead L.H.		
Port Knockie.	Galway.		
Cullen.			
Portsoy.	IRELAND, N.W.		
Banff.			
Fraserburgh.	Killybegs L.H.		
Peterhead.	Tory Island L.H.		
Aberdeen.	Lough Swilly L.H.		
Girdleness L.H.	Rathmullan.		
	Malin Head.		
	Portrush.		
	Port Ballintrae.		

[*Continued.*

NORTHERN.	WESTERN.	SOUTHERN.	EASTERN.
SCOTLAND, E.	IRISH SEA.	ENGLAND, S.	ENGLAND, E.
Stonehaven.	Belfast.	Guernsey.	Sutton Bridge.
Montrose.	Donaghadee.	St. Helier's (Jersey).	Lynn.
Scurdy Ness L.H.	Burr Point.	Gorey ,,	Sheringham.
Broughty Ferry.	Howth.	Portland L.H.	Cromer.
Dundee.	Kingstown.	Weymouth.	Great Yarmouth.
St. Andrews.	Pt. of Ayre (I. of M.)	Anvil Point L.H.	Southwold.
Anstruther.	Ramsey ,,	Poole	Orford Ness L.H.
Pittenweem.	Douglas ,,	Hurst Castle L.H.	Ipswich.
Buckhaven.	Castletown ,,	Southampton.	Harwich.
Methil.	Silloth.	Hamble.	Gunfleet L.H.
Wemyss, West.	Maryport.	Yarmouth.	
Burntisland.	Workington.	Cowes.	
Grangemouth.	Whitehaven.	Ryde.	
Bo'ness.	Barrow.	St. Catherine's Pt.	
Granton.	Walney I. L.H.	Portsmouth.	
Newhaven.	Morecambe	Littlehampton.	
Leith.	Fleetwood.	Brighton.	
Fisherrow.	Blackpool.	Newhaven.	
Dunbar.	Lytham.		
Cockburnspath.	Southport.		
St. Abb's Head.	Formby.		
Eyemouth.	Liverpool.		
	Runcorn.		
	Hoylake.		
	New Brighton.		
	Connah's Quay.	ENGLAND, S.E.	
	Penmaenmawr.		
SCOTLAND, N.W.	Port Penrhyn.	Beachy Head.	
	Point Lynas L.H.	Eastbourne.	
Fair Isle L.H.	Skerries L.H.	Hastings.	
C. Wrath L.H.	Holyhead.	Rye.	
Stourhead L.H.	South Stack L.H.	Sandgate.	
Port of Ness.	Caernarvon.	Folkestone.	
Stornoway.	Port Dinorwic.	Dover.	
Island Glass L.H.		Deal.	
Portnaguiran.	ST. GEORGE'S CHANNEL.	Ramsgate.	
		Margate.	
	Aberystwyth.	Faversham.	
	Milford.	Sheerness.	
		Chatham.	
SCOTLAND, W.	BRISTOL CHANNEL.	Greenhithe.	
	Small's L.H.		
Glasgow.	Caldy L.H.		
Greenock.	Pembrey.		
Rothesay.	Llanelly.		
Lamlash.	Swansea.		
Carradale.	Briton Ferry.		
Campbelton.	Porthcawl.		
Mull of Cantire L.H.	Nash L.H.		
Rhuvaal L.H.	Penarth.		
Rhinns of Islay L.H.	Cardiff (Bute Dock).		
Ardrossan.	Do. (Barry Dock).		
Girvan.	Newport.		
Ballantrae.	Weston-super-Mare.		
Cairn Ryan.	Burnham.		
Corsewall Point L.H.	Bridgewater.		
Mull of Galloway L.H.	Lundy Island.		
	Ilfracombe.		
	Bull Point L.H.		
	Barnstaple.		
	Appledore.		

Continued

NORTHERN.	WESTERN.	SOUTHERN.	EASTERN.
	BRISTOL CHANNEL —*cont.*		
	Hartland Pt. L.H.		
	Boscastle.		
	Port Isaac.		
	Newquay.		
	Hayle.		
	Godrevy L.H.		
	St. Ives.		
	St. Sennen.		
	Newlyn, West.		
	Penzance.		
	Scilly.		

APPENDIX XI.

FISHERY BAROMETERS.

LIST of PLACES supplied with FISHERY BAROMETERS.

Shetland Isles.—Balta Sound, Uya Sound, Burravoe, Nesting, Lerwick, Sandwick, Scalloway, Symbister.

Orkney Isles.—Westray, Papa Westray, Burray, Kirkwall.

Scotland, east coast.—Duncansbay, Freswick, Auchengill, Keiss, Ackergill, Staxigoe, Wick, Lybster, Dunbeath, Inver, Portmahomack, Ballintore, Cromarty, Avoch, Nairn, Burghead, Portessie, Port Knockie, Portsoy, Whitehills, Gardenstown, Rosehearty, Pitullie, Fraserburgh, Inverallochy, Pointlaw, Findon, Portlethen, Skateraw, Stonehaven, Arbroath, East Haven, Broughty Ferry, St. Andrews, Crail, Cellardyke, St. Monance, Burntisland, Newhaven.

England, east coast.—Berwick, North Shields, South Shields, Sunderland, West Hartlepool, Staithes, Scarborough, Filey, Flamborough, Bridlington Quay, Withernsea, Hull, Lynn (2), Wells, Gorleston, Lowestoft, Orford Haven, Felixstowe, Harwich, Brightlingsea, West Mersea, Maldon, Leigh, Margate, Deal, Kingsdown, Dover.

England, south coast.—Bognor, Ryde, Bembridge, Brixton, Atherfield, Ventnor, Yarmouth (Isle of Wight), Gorey (Jersey), Haslar Hospital, Poole, Weymouth, Portland, Budleigh Salterton, Exmouth, Cawsand, Mevagissey, Gorranhaven, Devoran, Portscatho, Penryn, Durgan, Porthallow, Falmouth, Coverack, Newlyn (2), Mousehole, Penberth, Porth Guarra.

England, south-west coast.—St. Ives, Hayle, Port Isaac, Boscastle, Bideford, Burnham, Highbridge, Weston-super-Mare.

Wales.—Briton Ferry, Swansea, Angle, Milford, Aberystwyth, Navin, Carnarvon.

England, north-west coast.—Fleetwood, Morecambe, Maryport.

Isle of Man.—Douglas, Port St. Mary, Peel (2).

Scotland, south-west coast.—Port Patrick, Stranraer.

Ireland, east coast.—Cushendall, Belfast, Bangor, Groomsport, Donaghadee, Ardglass, Warren Point, Carlingford, Greenore, Dundalk, Malahide, Howth, Kingstown (2), Bray, Wicklow.

Ireland, south coast.—Dunmore East, Dungarvan, Crosshaven, Kinsale, Union Hall, Castletownsend, Baltimore, Schull (2), Crookhaven, Castletown (Berehaven), Lawrence Cove, Ballydonegan, Ballycrovane.

Ireland, west coast.—Valencia, Dingle, Tralee, Ballyheigue, Tarbert, Kilcredane, Kilronan, Galway, Spiddal, Elly Bay, Cleggan, Ballyglass, Ballycastle (Co. Mayo), Donegal, Tribane, Killybegs, Teelin, Malinmore, Portnoo, Burton Port, Kincaslagh, Bunbeg.

Ireland, north coast.—Dunfanaghy, Rathmullen, Buncrana, Malin Head, Moville, Greencastle, Portstewart, Portrush, Port Ballintrae, Ballycastle (Co. Antrim).

Scotland, west coast.—Lamlash, Tarbert (Loch Fyne), Loch Ranza, Campbeltown, Carradale, Portnahaven and Portwemyss (Islay), Portree and Armadale (Isle of Skye), Isle of Soay, Plockton, Ardneaskan, Shieldaig, Gruinard, Badachro, Ullapool, East Mey, Gills, Stroma (2), Bowmore (Islay).

Hebrides.—Stornoway, Portnaguran, Obb, Valtos, Carloway, Ness, Berneray.

APPENDIX XII.

METHODS FOLLOWED IN DEALING WITH METEOROLOGICAL RETURNS FROM LAND STATIONS IN THE BRITISH ISLES.

These stations are of eight classes, as stated on page 17.

I.—*Observatories continuously recording all the Meteorological Elements.*

Returns from observatories.

Hourly measurements of the curves obtained from the self-recording instruments at the observatories of the Office are made by the observers at each station, on printed forms supplied for the purpose, which, together with the curves, are forwarded to the Office weekly. They comprise measurements of the barograms, of the dry-bulb and wet-bulb thermograms, of the anemograms, and of the rain-gauge curves.

Examination of returns.

The measurements are subjected to a careful examination in order to ensure as far as possible their accuracy, and the revised regulations which have been adopted to secure this end will be found in the Report of the Office for 1890. They comprise rules for the guidance of the observers, as well as of the assistants charged with the examination of the work at the Office. Attention need be called here to only two of these rules, viz., (*a*) the use of subsidiary sheets on which are entered the results of a second set of measurements of the curves made after, and quite independently of, the first set, and with a different form of scale, the two sets of measurements being afterwards compared together, and any differences found inquired into and set right; and (*b*) the re-measurements of the curves made by the assistants at the Meteorological Office, and which are always at least 40 in number, and in doubtful cases many more, per month, for each element.

Results of examination and report to Council.

The attention of the observers is always drawn to such errors as may be detected, and to any failures in the continuity of the curves arising from failure of the light, stoppage of the clock, defective photography, faulty action of the wet-bulb thermometer, &c.; a report containing the results of the examination of each observatory being also submitted to the Council periodically. The tabulations are eventually bound and stored with the curves in the Office.

General supervision of observatory work.

In connexion with this work should be mentioned the general watch which has to be kept over the working of the observatories and of the instruments, not only to secure uniformity amongst them and observance of rules, but also to guard against small changes which are liable to occur at certain times, especially with the thermographs, and which may affect the scale-values of the instrument or the datum lines used for the tabulation of the curves. About twice a year this work calls for special examination, entailing some considerable time, and occasionally the engraving of new scales, for measuring the curves.

METHOD OF DEALING WITH THE NUMERICAL RESULTS FROM THE SELF-RECORDING OBSERVATORIES.

Interpolations.

In dealing with the tabulations the first step is to go over the sheets and fill up by interpolation, wherever possible, any gaps or breaks in the continuity of the record.

Publication of results.

The records having been made as complete as possible are then used for the calculation of daily and hourly mean values, for periods of five days, calendar months, and for the year ; which, together with other data obtained from the same source, are published under the title of "Hourly Means of the Readings obtained from the "Self-Recording Instruments at the Five Observatories under the "Meteorological Council." The volume for 1897 is in the press. See p. 18.

It will be noticed that this publication includes results from only five observatories, while on page 18 eight observatories are mentioned. Since the year 1884 the records at Glasgow and Stonyhurst have not been fully published by the Office (although the stations are partially subsidized by it, in order to maintain the record established in 1868 and published for the years 1869 to 1883), where, however, the curves are stored for future use if required.

Returns from both these observatories are published in "Returns from Stations of the Second Order," and meteorological results for Stonyhurst and Falmouth are printed independently by the College authorities, and by the Royal Cornwall Polytechnic Society respectively.

II.—*Anemographic Stations at which the Wind is recorded continuously.*

Anemographs.

The anemograms received from Alnwick Castle, Armagh, Deerness, Dublin, Fleetwood, Holyhead, North Shields, Scilly, and Yarmouth are regularly examined and tabulated in the Office (except those for Armagh, which are tabulated at the Observatory), and the sheets bound up in volumes. Besides special inquiries on legal and other points which arise from time to time, and in which these documents are of high importance, the tabulations are always employed in the preparation of the various Reports issued by the office. They are also regularly used in the checking of the Storm Warnings.

III.—*Barographic Stations at which the Atmospheric Pressure is continuously recorded.*

Barographs

These stations are for the most part either telegraphic reporting stations or stations of the second or third order. The instrument in most general use is Richard's self-recording aneroid. At the telegraphic stations the record is first used to indicate to the observers the changes which have occurred since the last observing hour, and these changes, when large, are reported by wire to London, and are used in preparing the forecasts. The curves themselves are forwarded to the Office weekly and are stored for future use.

IV.—*Sunshine Stations at which the duration of Bright Sunshine is continuously recorded.*

Sunshine records.

The daily sunshine cards which are now received from 63 Stations in the British Islands are examined generally, to guard against accidental changes in the adjustment of the instruments. Notes explaining any omission or accidental defect are added to the cards, if required, and they are duly stamped, dated, and then stored in the Office. It should, however, be added that returns of sunshine are received from other stations, at which the original records are retained.

Weekly totals of duration of sunshine.

A tabulation of most of the curves is published in the Weekly Weather Report, mentioned in Appendix VIII., and for those stations, which are also Stations of the Second Order, the monthly totals of bright sunshine in hours, together with the percentages of its possible duration, are published as Part IV. of "Returns from Stations of the Second Order." Hourly tabulations are made in the Office of the returns from the observatories, and the mean hourly amounts are published in the volumes of "Hourly Means." A table showing the daily amount of sunshine at Bunhill Row, one of the London stations, is also prepared quarterly, for the Royal Meteorological Society.

V.—*Telegraphic Reporting Stations.*

Telegraphic stations.

These are now 25 in number in these islands, and the particulars as to the observations taken at them, and the methods adopted in dealing with them, will be found fully detailed in Appendix VII. to the Report for 1888–89, and in Appendix VIII. to the present volume.

VI.—*Land Stations.*

Origin and progress of system.

Ever since the year 1866 returns of more or less completeness have been received from land stations in the United Kingdom.

The number of stations has gradually increased, until at the end of March, 1900, the total number was 170, including 23 belonging to the Royal Meteorological Society and 19 belonging to the Scottish Meteorological Society. Copies of these latter returns are sent to the Office under special arrangements with the Societies.

The Stations of the Second Order are 84 in number, and distributed as follows:—46 in England, 3 in Wales, 24 in Scotland, and 11 in Ireland.

The methods followed with regard to the examination and publication of these returns have been fully detailed in previous Reports, and need not now be repeated. The changes introduced into the volume for 1886 have been continued in those for later years. These refer to the barometer readings, which are now given at station-level instead of being reduced to the mean sea-level; and to the humidity, where the depression of wet bulb is shown, the international forms A and B being modified accordingly.

The volume of "Returns from Stations of the Second Order" for 1897, now in the Press, will contain returns from 78 stations.

Reports from the Irish stations are regularly supplied to the Registrar-General for Ireland for his Weekly and Quarterly Returns.

New stations.

When an application for the adoption of a new station is received, a schedule is forwarded to the observer containing a series of questions as to the outfit of the station, the exposure of the instruments, and the influence likely to be exerted on their indications by surrounding objects, such as houses and trees. Only mercurial barometers are accepted, and only such as have been duly verified. All thermometers must have been tested at Kew. A plan of the station, showing the positions of the instruments with regard to neighbouring objects, is also required.

On the return of this schedule the answers are considered, and, when necessary, alterations are advised.

If, however, the existing arrangements are satisfactory, tables for reducing the barometer readings to 32° Fahrenheit at mean sea-level are prepared and duplicates sent to the observer, together with a set of Hygrometrical Tables, and a copy of "Instructions in the Use of Meteorological Instruments."

The first returns are compared and examined with special care, and a report of the result of the examination is forwarded to the observer, with instructions how best to improve and complete the returns.

There are still many parts of the British Islands very poorly represented by the existing stations; for instance, Wales, the northen coasts of Cornwall and Devon, Somersetshire, Essex, the south-east of Ireland, &c., and any information for these districts would be valuable.

VII.—*Land Stations of the Third Order.*

These are 87 in number. The information supplied from them is, in some cases, similar to that supplied by a station of the second order, but taken only once daily, or at irregular hours, or perhaps less complete. At other stations less detail is given; for instance, 52 stations furnish only the daily rainfall. All the information thus afforded is utilised in some way or other, though it is not all included in the Office publications. The rainfall values are copied and supplied for publication in "British Rainfall," which was compiled for many years by the late Mr. G. J. Symons, F.R.S., and is being continued under the editorship of Mr. Sowerby Wallis, F.R.Met. Soc.

VIII.—*Sea Temperature Stations.*

These are 50 in number, comprising 19 light-vessels, 28 coast-guard stations, and 3 others,—Scilly, Holyhead, and St. Ann's Head. The observations are taken twice daily, namely, at or about sunrise, and at 4 p.m., and they are sent to the Office quarterly.

Inspection.

All the Stations supplying information to the Office are inspected. Some of them are visited every year, but the less important stations are not visited so frequently. Extracts from the reports of the inspectors will be found in Appendix XIV., p. 73. Inspections.

List of Stations.

In Appendix XIII., p. 62, is given a complete list of the stations from which information has been received by the Office during the year ended March 31st, 1900.

APPENDIX XIII.

LIST of STATIONS in the BRITISH ISLANDS from which INFORMATION has been received at the METEOROLOGICAL OFFICE during the Year ended March 31st, 1900.

The Stations marked "S" are in connexion with the Scottish Meteorological Society, and those marked "M" are in connexion with the Royal Meteorological Society. The returns from these Stations are received by the Office under an arrangement which will be found detailed in previous reports.

In certain cases where the actual station at which the Observations have been taken is not generally known, and could not be readily identified, the name of some village or town near has been inserted following the name of the station, within brackets.

The nature of the information received from each station is indicated by letters, as follows :—

A.—Continuous record of pressure, temperature, wind, sunshine, and rain, with eye observations of the amount, form, and motion of the clouds, and notes on the weather. (Class 1, Observatories, p. 17.)

B.—Continuous record of the direction and velocity (or force) of the wind. (Class 2, Anemographic Stations, p. 17.)

C.—Continuous record of pressure. (Class 3, Barographic Stations, p. 17.)

D.—Monthly sheets, containing the regular observations at 9 a.m. and 9 p.m. each day, local time, of pressure, temperature (dry bulb and wet bulb), wind, cloud, and weather, with the daily maximum and minimum of temperature, the daily rainfall, and general remarks on the weather. (Class 6, Second Order Stations, p. 17.)

E.—Monthly means and summaries on Form B. of observations taken at 9 a.m. and 9 p.m. each day as above. (Class 6, Second Order Stations, p. 17.)

F.—The maximum and minimum temperature, and the rainfall for each day, with remarks on the weather. This information is received in the Meteorological Office each week for use in the "Weekly Weather Report." (Various Classes, p. 17.)

G.—Observations of the same kind as at Second Order Stations, but either—

(*a*) Less full.
(*b*) Taken only once daily.
(*c*) Taken at hours other than 9 a.m. and 9 p.m. (Class 7, Third Order Stations, p. 17.)

R.—Monthly sheets containing the daily observations of the amount of rainfall, with remarks on the weather. (Class 7, Third Order Stations, p. 17.)

S.—Continuous record of bright sunshine. (Class 4, Sunshine Stations, p. 17.)

T.– Regular observations at 8 a.m. and 6 p.m. G.M.T. (and from some stations at 2 p.m. in addition), of pressure temperature, wind and weather, with the daily maximum and minimum of temperature, the daily rainfall, and, where possible, the sea disturbance at 8 a.m. each day, and the daily amount of bright sunshine. This information is received at the Meteorological Office each day by telegraph, for use in the "Daily Weather Report" and in the "Weekly Weather Report." (Class 5, Telegraphic Stations, p. 17.)

W.—Daily observations of the temperature of the sea water. (Class 8, Sea Temperature Stations, p. 17.)

	Station.	Lat.	Long.		Height in feet above M.S.L.	Observer.	Nature of Information supplied.	Page where Inspector's Report for 1899 will be found.
		° ′	° ′					
	Aberdeen Observatory ..	57 10	2 6	W.	46	Prof. C. Niven, F.R.S. ..	A. T. C	79, 93
	,, Cove Bay	57 9	2 5	,,	—	Coastguard	W.	
	Aberdovey	52 33	4 4	,,	—	John Edwards	S.	
	Adare	52 33	8 47	,,	—	W. Bowles	R.	
	Alnwick Castle	55 25	1 43	,,	210	Humphry Willyams, for the Duke of Northumberland.	B. F.	97, 109
	Ampleforth	54 12	1 5	,,	349	Rev. J. B. McLaughlin, O.S.B.	D.	
	Ardross Castle, N.B... ..	57 45	4 21	,,	449	W. Minty	R.	
	Arlington Court(Barnstaple)	51 8	3 58	,,	613	Lady Chichester	F.	89
	Armagh Observatory ..	54 21	6 39	,,	196	J. L. E Dreyer, Ph.D. ..	B.D.F.S.	93, 96
	Arran, North, Galway ..	53 6	9 40	,,	—	Coastguard	G. W.	
	Aspley Guise, Beds.	52 1	0 38	,,	410	E. E. Dymond	S.	
	Aysgarth Vicarage, Yorks.	54 18	1 58	,,	646	Rev. F. W. Stow, M.A. ..	D.	81
	Bahama Bank Lightship ..	54 20	4 13	,,	—	Light-keepers	W.	
	Ballantrae, Ayrshire ..	55 6	5 0	,,	—	Coastguard	W.	
	Ballydonegan, Co. Cork ..	51 38	10 3	,,	—	,, ...	W.	
	Ballyglass, Co. Mayo ..	54 17	9 52	,,	—	,, ...	W.	
	Baltimore, Co. Cork	51 28	9 22	,,	—	,, ...	G.	
	Barvin (Potter's Bar) ..	51 41	0 8	,,	?400	W. E. Dalston	R.	
	Belfast, Queen's College ..	54 35	5 56	,,	61	John Wylie	D.	73
	Belmullet, Co. Mayo ..	54 13	9 59	,,	40	Miss E. Tolan	T.	
	Belvoir Castle (Grantham)	52 54	0 47	,,	259	W. H. Divers, for the Duke of Rutland.	D.	
S	Ben Nevis	56 48	5 0	,,	4,406	A. Rankin, for Directors Ben Nevis Observatory.	A. E.	
M	Bennington, Herts.	51 54	0 5	,,	407	Rev. J. D. Parker, LL.D.	E.	
M	Berkhamsted	51 46	0 34	,,	400	E. Mawley, F.R. Met. Soc.	E.	
	Bidston Observatory (Liverpool).	53 24	3 4	,,	188	W. E. Plummer, F.R.A.S.	D. T.	81
	Birr Castle (Parsonstown)	53 6	7 55	,,	175	J. Spooner and T. Colvin, for the Earl of Rosse.	D. S. T.	74
M	Blackpool	53 48	3 3	,,	62	A. J. Anderson, M.A., M.B., for the Corporation.	F. S.	
	Blacksod Point, Co. Mayo..	54 6	10 4	,,	37	A. Marshall	W. T.	73
	Bognor	50 47	0 40	,,	—	H. C. L. Morris, M.D., for the Corporation.	S.	
	Bolton	53 35	2 27	,,	389	W. W. Midgley, for the Corporation.	G.	
	Bournemouth..	50 43	1 53	,,	—	Messrs. Primavesi, for Town Council.	S.	
S	Braemar	57 0	3 24	,,	1,111	J. Aitken, J.P.	D. F. S.	
	Bramley, Surrey	51 11	0 33	,,	148	J. Bartlett, M.A.	D.	
	Bray, Co. Wicklow	53 12	6 6	,,	—	Coastguard	G.	
	Brighton	50 49	0 8	,,	65	A. Newsholme, M.D., for the Corporation.	S.	
	Burford, Oxon	51 48	1 38	,,	420	M. Jacobs	R.	
	Burnmouth(Ayton,Berwick)	55 51	2 4	,,	—	Coastguard	W.	
	Burntisland	56 4	3 14	,,	—	,, ...	W.	
M	Buxton	53 14	1 54	,,	987	W. Pilkington	E.	
	Caernarvon Bay Lightship	53 6	4 45	,,	—	Light-keepers	W.	
	Cambridge	52 13	0 6	E.	83	Miss A. Walker, for Sir Robt. Ball, F.R.S.	T. S. D.	
	Cardigan Bay Lightship	52 25	5 1	W.	—	Light-keepers	W.	
S	Cargen	55 2	3 37	,,	72	A. Peacock	E.	
	Carrigallen, Co. Leitrim ..	53 58	7 38	,,	?350	Mrs. J. Godley and Miss Morrow.	R.	
	Castletownshend, Co. Cork	51 32	9 11	,,	—	Coastguard	G.	
	Chatham	51 23	0 32	E.	136	The Instructor in Surveying.	G.	89
M	Cheadle	52 58	1 57	W.	646	J. C. Philips	E. F.	
M	Cheltenham	51 54	2 3	,,	184	R. Tyrer, B.A.	E.	
	Chester	53 12	2 54	,,	59	Rev. J. Cairns Mitchell, B.D.	D.	
	Churchill, Oxon	51 56	1 34	,,	509	Giles Edmonds	R.	
M	Churchstoke	52 31	3 5	,,	538	P. Wright, F.C.S.	D. F. S.	
	Cirencester	51 43	1 57	,,	446	Prof. G. T. Locke, M.A. ..	F. S.	
	Cleggan, Co. Galway ..	53 33	10 8	,,	—	Coastguard	W.	
	Clifton	51 27	2 37	,,	290	D. Rintoul, M.A.	F.	

Station.	Lat.	Long.	Height in feet above M.S.L.	Observer.	Nature of Information supplied.	Page where Inspector's Report for 1899 will be found.
	° ′	° ′				
Colly Weston	52 57	0 31 W.	280	Miss A. Tasker	R.	
Colwyn Bay	53 17	3 43 „	—	R. E. Lord, M.D., B.Sc. ..	S.	
Coningbeg Lightship ..	52 2	6 40 „	—	Light-keepers	W.	
Cooper's Hill (Egham) ..	51 26	0 34 „	279	Prof. H. McLeod, F.R.S. ..	G.	
Cranleigh	51 8	0 29 „	232	Rev. G. C. Allen	F.	
Cromarty	57 41	4 0 „	—	Coastguard	W.	
Cronkbourne (Douglas) ..	54 10	4 29 „	137	A. W. Moore, M.A.	D. F. S.	81
Crookhaven	51 28	9 43 „	—	Coastguard	G.	
Cromhaven	51 48	8 18 „	—	„	G.	
Cuckfield, Sussex	51 1	0 9 „	389	John Howe	R.	
Cullompton	50 51	3 23 „	202	T. Turner, J.P.	F. S.	
Currygrane (Edgeworthstown), Co. Longford.	53 45	7 39 „	267	J. M. Wilson, M.A.	D.	
Darwen, Lancashire ..	53 41	2 28 „	710	G. Mainland, for the Corporation.	S.	82
Deerness, Orkney Islands ..	58 56	2 45 „	160	M. Spence	B. D. S.	96
Disserth (Llandrindod) ..	52 13	3 24 „	711	Rev. J. Le Herbert	R.	
Dolmelynllyn (Dolgelly) ..	52 47	3 53 „	—	W. Simmonds	R.	
Donaghadee	54 38	5 32 „	40	J. Conolly	T.	73
Doneraile, Co. Cork	52 13	8 34 „	266	Capt. J. W. Evans, J.P. ..	R.	
Dover	51 7	1 18 E.	198	H. E. Stilgoe, C.E.	R.	
Dublin, Botanic Gardens ..	53 23	6 16 W.	67	F. W. Moore, M.R.I.A. ..	D.	74
„ City	53 20	6 15 „	47	Sir J. W. Moore, M.D. ..	D. F.	
„ Phœnix Park ..	53 22	6 21 „	155	Major Sim, R.E., and Major Haynes, R.E.	B. D. S.	94, 95
Duddington	52 36	0 32 „	152	*The late* Fred Coventry ..	F. R.	86
Dundee	56 28	2 56 „	160	J. Carnochan	D. S.	79
Dungeness	50 55	0 58 E.	26	W. H. Taylor	T.	90
Dunrobin Castle	57 59	3 56 W.	12	D. Melville, for the Duke of Sutherland.	D.	78
Durham	54 46	1 35 „	336	H. J. Carpenter and Prof. R. A. Sampson, M.A.	D. F. S.	85
Dursley, Glos.	51 41	2 21 „	250	R. W. Pinney	R.	
Eastbourne	50 46	0 17 E.	39	R. Sheward, for the Corporation.	D. S.	89
East Goodwin Lightship ..	51 13	1 36 „	—	Light-keepers	W.	
East Dereham	52 41	0 57 „	158	G. H. H. Cooper	R.	
Edgbaston (Birmingham) ..	52 28	1 56 W.	534	Alf. Cresswell	D.F.S.	81
Edinburgh	55 57	3 12 „	253	R. C. Mossman, F.R.S.E. ..	D. S.	79
English and Welsh Grounds Lightship.	51 27	3 0 „	—	Light-keepers	W.	
Ennis, Co. Clare	52 51	8 59 „	38	Miss A. L. Scott	R.	
Ennistymon, Co. Clare ..	52 57	9 17 „	131	Rev. C. W. McDowell, M.A.	R.	
Falmouth	50 9	5 4 „	167	E. Kitto	A. F.	94, 96
Felixstowe	51 58	1 22 E.	76	Rev. J. G. Munday, M.A. ..	F. S.	86
Fleetwood	53 56	3 1 W.	—	M. S. Gaulter, C.E.	B.	92
Forgandenny, Perth ..	56 21	3 29 „	175	C. L. Wood	C.	
Forest Row, Sussex ..	51 7	0 2 E.	619	Rt. Hon. J. Bryce, D.C.L., M.P.	R.	
Fort Augustus	57 8	4 40 W.	68	Rev. J. M. Wall	E. F. S.	78
Fort William	56 49	5 7 „	31	A. Rankin, for Directors, Ben Nevis Observatory.	A. F.	77 92
Foynes, Co. Limerick ..	52 37	9 7 „	108	W. H. Ward, for Lord Monteagle.	F.	
Fulbeck, Lincolnshire ..	53 3	0 37 „	185	Rev. V. F. Willson, M.A. ..	C. D	86
Geldeston (Beccles)	52 28	1 31 E.	37	E. T. Dowson	D. F. S.	86
Glasgow	55 53	4 18 W.	180	Prof. L. Becker, Ph.D. ..	A. D. F.	79, 99
Glencarron	57 30	5 14 „	489	D. D. Munro	E. F.	
Glenlee	55 5	4 12 „	203	W. Melville	E. F.	
Gordon Castle	57 37	3 5 „	101	C. Webster, for the Duke of Richmond and Gordon, K.G.	E.	79
Gorleston (Gt. Yarmouth)	52 35	1 43 E.	—	*The late* R. J. C. Day ..	G.	
Hasler Hospital, Hants. ..	50 47	1 7 W.	--	C. Seaman	G.	

Station.	Lat.	Long.	Height in feet above M.S.L.	Observer.	Nature of Information supplied.	Page where Inspector's Report for 1899 will be found.
Hawes Junction	° ′ 54 19	° ′ 2 18 W.	1,135	W. H. Bunce	G.	
Hesley Hall (Bawtry) ..	53 27	1 4 „	65	B. I. Whitaker, J.P. ..	F.	85
Hereford	52 5	2 45 „	291	Rev. J. M. Dawson and Rev. T. B. Harrington.	F.	
Heysham Hall, Lancashire	54 3	2 54 „	95	S. Lomas, for Miss L. Grafton.	D.	
Hidcote (Campden), Glos...	52 5	1 46 „	524	Capt. W. Wright, R.A. ..	R.	
Hillington	52 48	0 33 E.	88	Rev. H. E. B. Ffolkes, M.A.	D. F. S.	
Hollesley Bay, Suffolk ..	52 3	1 27 „	38	Prof. C. G. Freer Thonger, F.C.S. ..	D. S.	88
Holyhead, Harbour Office..	53 18	4 39 W.	57	F. M. Cotton, C.E.	B. W.	74, 84
„ Sailors' Home ..	53 18	4 39 „	48	T. Chope	T.	74
Hoylake, Cheshire	53 23	3 12 „	—	T. Foster	S.	
Hurdlestown (Broadford), Co. Clare.	52 48	8 38 „	157	Lieut.-Col. W. O. Bentley, R.A.	R.	
Hurst Castle	50 42	1 33 „	12	E. T. Tremble	T.	86
Kearsney Abbey (Dover) ..	51 8	1 17 E.	?100	C. W. Curtis	R.	
„ Chilton Farm ..	51 8	1 17 „	135	H. E. Stilgoe, C.E.	R.	
Ketton Hall (Stamford) ..	52 38	0 32 W.	—	J. H. Browett	R.	86
„ Vicarage	52 38	0 32 „	109	Rev. A. Swire	R.	86
Kew Observatory	51 28	0 19 „	18	C. Chree, D.Sc., F.R.S. ..	A.	
Kilcredane, Co. Clare ..	52 35	9 47 „	—	Coastguard	W.	
Kilkenny	52 39	7 14 „	212	H. Carlton, for the Marquis of Ormonde.	C. F.	74
Killarney	52 4	9 30 „	86	Ven. Archdeacon Wynne	G. F.	
Killiney, Co. Dublin ..	53 16	6 7 „	249	R. O'Brien Furlong ..	R.	
Kirkwall	58 59	2 57 „	—	Coastguard	W.	
Kish Bank Lightship ..	53 19	5 55 „	—	Light-keepers	W.	
Ladylaw (Hawick)	55 28	2 47 „	447	T. Wilson	D.	
Lahinch, Co. Clare	52 55	9 21 „	52	Miss I. F. K. Bowes ..	R.	74
Lairg	58 1	4 22 „	335	Rev. D. Macrae	E. F.	78
Lamlash, Isle of Arran ..	55 32	5 8 „	—	Coastguard	G. W.	
Laudale, Argyleshire ..	56 41	5 41 „	14	A. Fletcher, for T. H. G. Newton, M.A.	D. F.	
Lednathie	56 45	3 7 „	719	W. Morrison, for P. Stormonth Darling.	E.	
Leith	55 58	3 10 „	19	T. Richardson	T.	79
Leman and Ower Lightship	53 8	2 2 E.	—	Light-keepers	W.	
Lerwick	60 9	1 8 W.	—	Coastguard	W.	
Limerick	52 39	8 36 „	—	A. W. Shaw	R.	
Liscannor, Co. Clare ..	52 56	9 23 „	—	Coastguard	W.	
Lissan, Co. Tyrone	54 41	6 45 „	300	*The late* Sir N. Staples, Bt.	E.	
Littlestone-on-Sea	50 59	0 59 E.	—	W. Walsh, for H. T. Tubbs	G. S.	89
Llandinam, Montgomery ..	52 29	3 26 W.	500	John Owens	R.	
Llandovery	51 59	3 48 „	217	J. Watkins	F.	
Llandudno	53 21	3 50 „	72	Wm. Little, for Town Council.	E. F. S.	
London, Brixton	51 27	0 8 „	77	F. Gaster	T.	
„ City	51 31	0 5 „	80	Messrs. de la Rue	S.	
„ Hampstead ..	51 34	0 10 „	—	H. R. Beeton	C.	
„ Pall Mall	51 30	0 7 „	—	Athenæum Club	C.	
„ Westminster ..	51 30	0 8 „	76	The Staff of the Met. Office	C. G.	
„ Westminister Training College.	51 30	0 8 „	—	H. A. Reatchlous, M.A. ..	S.	
Londonderry	55 0	7 19 „	67	J. Conroy	D. F.	73
Loughborough	52 47	1 12 „	146	W. Berridge	T.	
Lowestoft	52 29	1 44 E.	—	C. J. Heppell	G.	
Lowestoft	52 29	1 44 „	84	S. H. Miller	E. S.	87
Lytham	53 44	2 58 W.	21	Medical Officer of Health, for the Corporation.	D. S.	81
Maidenhead	51 30	0 43 „	99	G. H. Palmer	G.	89
Malin Head, Co. Donegal ..	55 23	7 24 „	230	J. Putt	T. O.	73
Mallaranny	53 56	9 40 „	119	Miss M. Kilsby	R.	
Manchester	53 29	2 13 „	190	J. Niven, M.A., M.B., for the Corporation.	D.	82
Marchmont	55 44	2 25 „	498	J. A. Wood	E. F. S.	
Margate	51 24	1 24 E.	83	J. Stokes, J.P...	S.	
Market Rasen	53 23	0 20 W.	83	W. B. Jevons	R.	

	Station.	Lat.	Long.	Height in feet above M.S.L.	Observer.	Nature of Information supplied.	Page where Inspector's Report for 1899 will be found.
		° ′	° ′				
	Markree Castle, Co. Sligo ..	54 11	8 27 W.	122	F. W. Henkel, B.A., for Col. Cooper.	D. F. S.	73
	Minard, Co. Kerry	52 7	10 8 „	—	Coastguard	W.	
	Morpeth	55 13	1 41 „	324	G. P. Berry and T. V. Steele	D. S.	87
	Mount Callan (Inagh), Co. Clare.	52 53	9 16 „	479	Lt.-Col. Tottenham ..	R.	
	Nairn	57 36	3 52 „	82	Miss Penny	T.	78
	Newarp Lightship	52 45	1 53 E.	—	Light-keepers ..	W.	
	Newcastle, Co. Wicklow ..	53 5	6 6 W.	256	Dr. B. H. Steede	D.	74
	Newcastle-on-Tyne . ..	54 59	1 36 „	152	N. H. Martin, F.C.S. ..	G. S.	87
	Newmarket-on-Fergus ..	52 48	8 53 „	—	W. W. FitzGerald	R.	
	Newport, Monmouth ..	51 35	3 0 „	—	C. Cullum	R.	
	Newquay, Cornwall ..	50 25	5 4 „	?250	J. Pearce	S.	
	„ „ ..	50 25	5 5 „	—	Coastguard	W.	
	Newton Reigny (Penrith)..	54 41	2 48 „	579	T. G. Benn	F. S.	81
	Northallerton	54 20	1 26 „	129	W. Stead, C.E.	R.	
	North-West Lightship ..	53 31	3 31 „	—	Light-keepers	W.	
M	Norwood	51 26	0 6 „	320	W. Marriott	E.	
S	Ochtertyre	56 23	3 53 „	329	G. Croucher, for Sir P. K. Murray, Bt.	E. F.	77
	Omagh (Edenfel)	54 36	7 19 „	300	Col. Buchanan, C.B. ..	F.	73
	Oswaldkirk, Yorkshire ..	54 12	1 3 „	510	R. Thompson	S.	
	Outer Dowsing Lightship	53 27	1 5 E.	—	Light-keepers	W.	
	Owers Lightship	50 39	0 41 W.	—	„	W.	
	Oxford	51 46	1 16 „	208	A. A. Rambaut, M.A. ..	T. S.	99
	Pant-y-reos	51 38	3 4 „	449	C. Cullum	R.	
	Parkstone, Dorset	50 43	1 56 „	197	R. H. Barnes, B.A.	D.	
	Penbedw (Mold)	53 12	3 11 „	650	H. W. Buddicom	C.	
	Pennant Bay (Aberdour) ..	57 40	2 16 „	—	Coastguard	W.	
	Pennington	50 46	1 35 „	—	Miss H. Fullerton	R.	
	Peper Harow	51 11	0 40 „	199	John Warner	R.	
S	Pinmore (Girvan)	55 12	4 49 „	187	P. Donald, for Capt. Hamilton.	E.	79
	Plumstead	51 29	0 6 E.	?85	J. G. Waller	S.	
	Plymouth, The Hoe.. ..	50 22	4 8 W.	116	H. Victor Prigg, C.E., for the Corporation.	D. F. S.	80
S	Poltalloch	56 8	5 30 „	132	D. S. Melville, for Lord Malcolm.	E.	
	Portland Bill	50 32	2 27 „	177	C. Smith	T.	
	Portrush	55 13	6 40 „	—	Coastguard	W.	
	Port Talbot	51 34	3 45 „	—	R. Milner, for Miss Talbot	S.	
	Prawle Point	50 12	3 43 „	332	T. Howse	T.	80
	Prestwich (Manchester) ..	53 32	2 17 „	320	T. R. H. Clunn, M.D. ..	D. F. S.	82
	Quin, Co. Clare	52 48	8 52 „	—	Mrs. Hallam Studdert ..	R.	74
	Recess, Co. Galway... ..	53 28	9 44 „	90	A. A. Smith	R.	
	Rede Court (Rochester) ..	51 24	0 29 E.	224	W. H. Tingey, B.A.	D.	89
	Rhyl	53 19	3 29 W.	—	T. F. Hughes..	S.	
	Ridgmont	52 1	0 36 „	291	H. A. Mann, B.Sc., and H. M. Freear.	D.	
	Ridlington	52 37	0 45 „	522	N. W. Wortley	R.	
	Roche's Point, Co. Cork ..	51 47	8 15 „	42	W. Kennedy	T.	74
	Rochford (Tenbury) ..	52 18	2 36 „	316	Rev. John Tomson	C. R.	
S	Rosewell	55 51	3 7 „	690	R. B. Mitchell	E.	79
	Rothamsted	51 48	0 22 „	308	Sir J. B. Lawes, Sir J. H. Gilbert, and T. Wilson.	F. G. S.	90
S	Rothesay	55 50	5 4 „	115	J. Kay	E.	
M	Rounton, Yorkshire ..	54 24	1 18 „	242	Sir I. L. Bell, Bart., F.R.S.	E.	
M	Rousdon, Devon	50 43	3 0 „	515	Sir C. E. Peek, Bart., M.A.	E.	
	Roxborough, Co. Limerick	52 35	8 36 „	111	A. W. Shaw	R.	
	Royal Sovereign Lightship	50 43	0 27 E.	—	Light-keepers	W.	
	Rugby	52 22	1 15 W.	379	E. Kitchener, M.A., and St. J. B. W. Willson, M.A.	G.	
	St. Ann's Head, Pembroke	51 41	5 30 „	150	G. H. Dunsford	T. S. W.	74
	St. Aubin's, Jersey	49 12	2 11 „	25	J. Fisher	I.	90

Station.	Lat.	Long.	Height in feet above M.S.L.	Observer.	Nature of Information supplied.	Page where Inspector's Report for 1900 will be found.
	° ′	° ′				
St. David's, Pembrokeshire	51 53	5 16 W.	215	W. P. Propert, LL.D. ..	D.	
St. Helen's, Lancashire ..	53 28	2 45 „	151	F. Drew Harris, M.D., for the Corporation.	G.	
St. Heliers, Jersey	49 11	2 6 „	—	Signal Officer, Fort Regent	S.	
St. Leonard's	50 51	0 33 E.	178	H. Colborne, M.R.C.S., for the Corporation.	D. F. S.	89
„ (West Marina)	50 51	0 32 „	—	T. Eldridge, for the Corporation.	G.	89
St. Peter Port, Guernsey ..	49 32	2 32 W.	222	F. E. Carey, M.D.	S.	
Salcombe, Devon	50 14	3 46 „	—	Coastguard	W.	
Sandgate, Kent	51 4	1 9 E.	56	A. Robert Bowles, C.E. ..	R.	91
Scarborough	54 18	0 24 W.	219	E. W. Ellerbeck and W. W. Larkin, for the Corporation.	D. F. S.	87
Scarborough	54 17	0 23 „	—	Coastguard	W.	
Schull	51 32	9 32 „	—	„	G.	
Scilly Islands, St. Mary's ..	49 56	6 18 „	65	A. Hicks	B. S. T. W. C.	81, 82
Seafield, Co. Clare	52 48	9 30 „	—	Coastguard	W.	
Seaham Harbour	54 50	1 19 „	148	G. H. Aird	D.	87
Seven Stones Lightship ..	50 4	6 5 „	—	Light-keepers	W.	
Shaftesbury	51 1	2 12 „	722	Miss L. H. Harris	F.	
Shambles Lightship ..	50 31	2 20 „	—	Light-keepers	W.	
Sheffield	53 23	1 29 „	429	E. Howarth, F.R.A.S. ..	D. S.	82
Sheephaven (Dunfanaghy)	55 11	7 58 „	—	Coastguard	W.	
Shields, North	55 0	1 27 „	99	W. B. Clark	T.	100
Shields, North, High Lighthouse.	55 0	1 27 „	—	T. Robson	B.	97
Shipwash Lightship ..	52 2	1 38 E.	—	Light-keepers	W.	
Shirley (Birmingham) ..	52 25	1 49 W.	460	B. Boothroyd	F.	81
Skipton	53 58	2 9 „	567	W. Farrer	G.	82
Solway Lightship	54 48	3 32 „	—	Light-keepers	W.	
Southampton	50 55	1 24 „	78	J. T. Cook, for Dir. Gen. of Ordnance Survey.	D. F. S.	
Southport	53 39	2 59 „	57	J. Baxendell, for the Corporation.	S.	
South Rock Lightship ..	54 25	5 22 „	—	Light-keepers	W.	
Spiddal, Co. Galway ..	53 15	9 17 „	—	Coastguard	G.	
Spurn Head	53 34	0 7 E.	26	A. S. Badcock	T.	87
Spurn Lightship	53 34	0 13 „	—	Light-keepers	W.	
Stokesay (Craven Arms) ..	52 26	2 52 W.	370	Rev. W. M. D. La Touche	D.	
Stonyhurst College	53 51	2 28 „	375	Rev. W. Sidgreaves ..	A. D. F.	92, 96
Stornoway	58 11	6 22 „	29	J. Mackenzie	T. S. C.	78
„	58 11	6 22 „	—	Coastguard	W.	
Stranraer	54 54	5 2 „	—	„	G.	
Strathpeffer-Spa, N.B. ..	57 37	4 28 „	253	J. Tregelles Fox, M.D. ..	D. S.	78
Sumburgh Head (Shetlands).	59 51	1 17 „	126	Rev. W. Brand	T. C.	
Sunderland	54 54	1 23 „	—	Coastguard	W	
Symbister, Shetlands ..	60 14	1 26 „	—	J. S. Nicolson	G.	
Syston, Leicester	52 43	1 5 „	178	S. K. Daniels	R.	
Tealby, Lincolnshire ..	53 24	0 16 „	251	Rev. S. Lewin, B.A. ..	D.	
Teelin, Co. Donegal	54 38	8 39 „	—	Coastguard	W.	
Temple Bruer, Lincolnshire	53 4	0 30 „	—	Miss G. Morley	R.	87
Tenby	51 41	4 42 „	79	R. J. Truscott, for the Corporation.	D. S.	75
Thurcaston (Leicester) ..	52 42	1 10 „	253	Rev. T. A. Preston, M.A. ..	S.	
Tixover Hall	52 35	0 33 „	129	Capt. H. E. Hotham ..	R.	88
Torquay	50 28	3 31 „	286	A. Chandler, for the Corporation.	S.	
Totland Bay, Isle of Wight	50 41	1 33 „	84	J. Dover, M.A.	G.	80
Union Hall, Co. Cork ..	51 33	9 8 „	—	Coastguard	G.	
Uzon (Montrose)	56 4	2 28 „	—	Coastguard	W.	
Valencia Observatory, Cahirciveen.	51 56	10 15 „	30	J. E. Cullum	A. T. C.	74, 93
„ Island, Glanleam	51 56	10 20 „	—	Miss E. FitzGerald	R.	
„ „ Knightstown	51 55	10 20 „	—	Coastguard	G.	
Ventnor	50 36	1 13 „	80	Miss M. Gibson	S.	

Station.	Lat.	Long.	Height in feet above M.S.L.	Observer.	Nature of Information supplied.	Page where Inspector's Report for 1899 will be found.
	° ′	° ′				
Wakefield	53 41	1 30 W.	96	A. Clyde	E.	
Waterford	52 16	7 7 „	—	Harbour Authorities ..	C.	
Watergate (Emsworth) ..	50 56	0 55 „	236	W. M. Christy	R. S.	90
Wealdstone	51 37	0 20 „	179	G. E. Eland	R.	
Wessington Court (Woolhope).	52 1	2 35 „	—	S. Lomas, for Miss L. Grafton.	D.	
Westbourne, Sussex	50 52	0 55 „	30	Rev. L. B. Birkett	S.	90
Westray, Orkney	59 17	3 0 „	—	Capt. J. Hewison	G.	
Whitchurch, Devon	50 32	4 6 „	593	E. E. Glyde	E.	
Wick	58 27	3 6 „	80	J. Sinclair	T.	78
„	58 27	3 6 „	—	Coastguard	W.	
Wolfelee	55 23	2 39 „	587	W. Gordon	D.	
Woolacombe, Devon ..	51 10	4 12 „	59	E. Henshall, C.E.	D.	
Worksop	53 22	1 5 „	56	H. Mellish	S.	
Worthing	50 49	0 23 „	38	C. Kelly, M.D., for the Corporation.	S.	90
Yarmouth, Norfolk	52 37	1 43 E.	10	G. T. Watson	B. T. C.	96, 100
Yarmouth, Isle of Wight ..	50 42	1 29 W.	—	Coastguard	G.	
Ynis-y-bro (Newport) ..	51 38	3 3 „	115	C. Cullum	R.	
York, Bootham	53 57	1 5 „	105	H. Richardson	S.	
„ The Museum	53 57	1 5 „	56	H. M. Platnauer, B.Sc. ..	D. T.	

In addition to those already mentioned, reports are received daily from the following Continental Stations.

Station.	Authority.	Station.	Authority.
Haparanda	Meteorological Office, Stockholm.	†The Helder	Bureau Central Météorologique, Paris.
Hernösand		Brussels	
†Stockholm		Cape Gris Nez	
Wisby		†Brest (St. Mathieu) ..	
Karlstad		Lorient (Île de Groix) ..	
Bodö	Meteorological Institute, Christiania.	*†Rochefort (Ile d'Aix) ..	
†Christiansund		†Biarritz	
*†Skudesnaes		†Paris	
Færder		Belfort	
†The Scaw	Meteorological Institute, Copenhagen.	Lyons	
Fanö		Nice	
Cuxhaven	Deutsche Seewarte, Hamburg.	Perpignan	
		Berlin	Cent. Met. Inst. of Germany.
		Wiesbaden	
		Munich	
		Corunna	Observatory, Lisbon.
		†Lisbon	
		Azores (P. Delgada) ..	

Note—The stations marked with an asterisk (*) report also at 2h. p.m., and those with dagger (†) at 6h. p.m.; Lisbon reports at 4h. p.m. instead of 6h. p.m.

The Helder does not send reports at 6 p.m. on Sundays.

LIST OF BRITISH STATIONS ARRANGED UNDER COUNTIES.

County.	Station.	County.	Station.
England :—		England—*cont.*	
Bedford... ...	Aspley Guise.	Kent	Rede Court.
	Ridgmont.		Sandgate.
Berkshire ...	Maidenhead.	Lancashire ...	Blackpool.
Buckingham ...	—		Bolton.
Cambridge ...	Cambridge.		Darwen.
Cheshire ...	Bidston.		Fleetwood.
	Chester.		Heysham.
	Hoylake.		Lytham.
Cornwall ...	Falmouth.		Manchester.
	Newquay.		Prestwich.
	Scilly.		St. Helens.
Cumberland ...	Newton Reigny.		Southport.
Derby	Buxton.		Stonyhurst.
Devon	Arlington.	Leicester ...	Belvoir Castle.
	Cullompton.		Loughborough.
	Plymouth.		Syston.
	Prawle Point.		Thurcaston.
	Rousdon.	Lincoln	Fulbeck.
	Salcombe.		Market Rasen.
	Torquay.		Tealby
	Whitchurch.		Temple Bruer.
	Woolacombe.	Middlesex ...	London :
Dorset	Parkstone.		City.
	Portland Bill.		Hampstead.
	Shaftesbury.		Pall Mall.
Durham ...	Durham.		Westminster.
	Seaham.		Wealdstone.
	Sunderland.	Monmouth ...	Newport.
Essex	—		Pant-y-reos.
Gloucester ...	Cheltenham.		Ynis-y-bro.
	Cirencester.	Norfolk... ...	East Dereham.
	Clifton.		Geldeston.
	Dursley.		Hillington.
	Hidcote.		Yarmouth.
Hampshire ...	Bournemouth.	Northampton ...	Colly Weston.
	Haslar.		Duddington.
	Hurst Castle.	Northumberland	Alnwick Castle.
	Pennington.		Morpeth.
	Southampton.		Newcastle-on-Tyne.
	Totland Bay.		North Shields.
	Ventnor.		
	Yarmouth.	Nottingham ...	Hesley Hall.
Hereford ...	Hereford.		Worksop.
	Wessington Court.	Oxford	Burford.
Hertford ...	Bennington.		Churchill.
	Berkhamsted.		Oxford.
	Rothamsted.	Rutland ..	Ketton Hall.
Huntingdon ...	—		Do. Vicarage.
Kent	Chatham.		Ridlington.
	Dover.		Tixover Hall
	Dungeness.	Shropshire ...	Stokesay.
	Kearsney.	Somerset ...	—
	Littlestone-on-Sea.	Stafford... ...	Cheadle.
	Margate.	Suffolk	Felixstowe.
	Plumstead.		Gorleston.

County.	Station.
England—*cont.*	
Suffolk	Hollesley Bay.
	Lowestoft.
Surrey	Bramley.
	Brixton.
	Cooper's Hill.
	Cranleigh.
	Kew.
	Norwood.
	Peper Harow.
Sussex	Bognor.
	Brighton.
	Cuckfield.
	Eastbourne.
	Forest Row.
	St. Leonards.
	Do. West Marina.
	Watergate Park.
	Westbourne.
	Worthing.
Warwick ...	Edgbaston.
	Rugby.
	Shirley.
Westmoreland ...	—
Wiltshire ...	—
Worcester ...	Rochford.
Yorkshire ..	Ampleforth.
	Aysgarth.
	Hawes.
	Northallerton.
	Oswaldkirk.
	Rounton.
	Scarborough.
	Sheffield.
	Skipton.
	Spurn Head.
	Wakefield.
	York.
Wales :—	
Anglesey ...	Holyhead.
Brecknock ...	—
Cardigan ...	—
Carmarthen ...	Llandovery.
Carnarvon ...	Llandudno.
Denbigh ...	Colwyn Bay.
Flint	Penbedw.
	Rhyl.
Glamorgan ...	Port Talbot.
Merioneth ...	Aberdovey.
	Dolmelynllyn.
Montgomery ...	Churchstoke.
	Llandinam.
Pembroke ...	St. Ann's Head.
	St. David's.
	Tenby.
Radnor	Disserth.
Islands :—	
Isle of Man ...	Cronkbourne.
Jersey	St. Aubin's.
	St. Heliers.
Guernsey ...	St. Peter Port.
Scotland :—	
Aberdeen ...	Aberdeen.
	Braemar.
	Pennant Bay.
Argyll	Laudale.
	Poltalloch.
Ayr	Ballantrae.
	Pinmore.
Banff	Gordon Castle.
Berwick ...	Burnmouth.
	Marchmont.
Bute	Lamlash.
	Rothesay.
Caithness ...	Wick.
Clackmannan ...	—
Cromarty ...	Cromarty.
	Strathpeffer Spa.
Dumbarton ...	—
Dumfries ...	—
Edinburgh ...	Edinburgh.
	Leith.
	Rosewell.
Elgin	—
Fife	Burntisland.
Forfar	Dundee.
	Lednathie.
	Uzon.
Haddington ...	—
Inverness ...	Ben Nevis.
	Fort Augustus.
	Fort William.
Kincardine ...	Cove Bay.
Kinross	—
Kirkcudbright	Cargen.
	Glenlee.
Lanark	Glasgow.
Linlithgow ...	—
Nairn	Nairn.
Orkney	Deerness.
	Kirkwall.
	Westray.
Peebles	—
Perth	Forgandenny.
	Ochtertyre.
Renfrew ...	—
Ross	Ardross Castle.
	Glencarron.
	Stornoway.
Roxburgh ...	Ladylaw.
	Wolfelee.
Selkirk	—
Shetlands ...	Lerwick.
	Sumburgh Head.
	Symbister.

County.	Station.
Scotland—*cont.*	
Stirling... ...	—
Sutherland ...	Dunrobin Castle.
	Lairg.
Wigton	Stranraer.
Ireland :—	
Antrim	Belfast.
	Portrush.
Armagh ...	Armagh.
Carlow	—
Cavan	—
Clare	Ennis.
	Ennistymon.
	Hurdlestown.
	Kilcredane.
	Lahinch.
	Liscanor.
	Mount Callan.
	Newmarket-on-Fergus.
	Quin.
	Seafield.
Cork	Ballydonegan.
	Baltimore.
	Castletownshend.
	Crookhaven.
	Crosshaven.
	Donerailе.
	Roches Point.
	Schull.
	Union Hall.
Donegal ...	Malin Head.
	Sheep Haven.
	Teelin.
Down	Donaghadee.
Dublin	Dublin (City).
	Do. (Mountjoy Barracks).
Dublin	Glasnevin.
	Killiney.
Ferranagh ...	—
Galway	Arran.
	Cleggan.
	Recess.
	Spiddal.
Kerry	Killarney.
	Minard.
	Valencia.
	Do. Glanleam.
	Do. Knightstown.
Kildare	—
Kilkenny ...	Kilkenny.
King's Co. ...	Birr Castle.
Leitrim	Carrigallen.
Limerick ...	Adare.
	Foynes.
	Limerick.
	Roxborough.
Londonderry ...	Londonderry
Longford ...	Currygrane
Louth	—
Mayo	Ballyglass.
	Belmullet.
	Blacksod Point.
	Mallaranny.
Meath	—
Monaghan ...	—
Queen's Co. ...	—
Roscommon ...	—
Sligo	Markree Castle.
Tipperary ...	—
Tyrone	Lissan.
	Omagh
Waterford ...	Waterford.
Westmeath ...	—
Wexford ...	—
Wicklow ...	Bray.
	Newcastle.

APPENDIX XIV.

REPORTS OF INSPECTIONS, 1899.

REPORT BY MR. R. H. SCOTT.

IRISH AND WELSH STATIONS.

Donaghadee, visited September 15th.—The station is new, as the duty of reporting has been undertaken by the coast guard, the observer being Mr. D. Connolly, the station officer. I found him very intelligent and satisfactory, and the position of the instruments is better than formerly.

Belfast, visited September 16th.—I found that Mr. Andrew Carr, Secretary to Moore & Co., opticians, whose name had been mentioned to me by the Lord Mayor, had no proper place for thermometers and rain-gauge.

I then went to the Queen's College. Prof. Morton was unfortunately absent at the British Association Meeting, but I saw his demonstrator, Mr. Wylie. The observations are taken by the porter who seems very competent. The site for the rain gauge is rather sheltered by trees and the College buildings, but the space available is not extensive, so that there is no choice.

Londonderry, visited September 18th.—I regret to say that I do not see prospect of improving the arrangements at this station, but it is the only one to be found in the locality.

Malin Head, visited September 19th.—The observer here, John Putt, is new and is very satisfactory. I am very glad to find such a competent man at this important station.

Edenfel, Omagh, visited September 21st.—This station calls for no remark.

Markree, visited September 22nd.—I found everything right here. Col. Cooper wishes to undertake Earth Temperature observations, and also to institute magnetic observations, for which he has the necessary instruments, and an observer, Mr. Henkel, who has been trained at Kew Observatory.

Blacksod, visited September 25th.—I removed the instruments from Belmullet to this station. I had had some conversation with Mr. Abraham Marshall, the station officer, on the 24th, but on the day of inspection he had to leave for drill, so I had to instruct Hodge, the chief boatman.

The thermometers and rain-gauge are very well exposed in the coast guard enclosure. The site is good, and the sea disturbance is regularly observed by a look-out man from a signal tower, three times a day. Such information was unattainable at Belmullet. I have every confidence that Mr. Marshall will be a good observer. Blacksod commenced reporting by telegraph on October the 8th.

Glasnevin, visited September 28th.—This station was in good order. The observer, Pope, will be superannuated at the end of next month. I did not see his successor.

Newcastle, visited September 29th.—This station, at the Consumption Hospital, is very good. Dr. Steede, the physician in charge, is the observer. It is proposed to add to the buildings, and I cannot foresee whether the exposure will be affected.

Holyhead, visited October 2nd and 3rd.—I found that the new staging for the Robinson anemometer was all but completed. The altitude of the cups above the recording apparatus will be more than seven feet greater than it was at the old lighthouse, so I requested Mr. Cotton to send up the shafts to be lengthened before erection of the instrument. I also requested him to dismount the apparatus in the lighthouse. I visited the Sailor's Home on the 3rd, and found the reporting instruments in good order, and the station satisfactory.

Birr Castle, visited October 4th.—I found this station in fairly good order. The new climatological observer, John Spooner, is an army pensioner. I had occasion to speak to him about erroneous reports.

Lahinch, Co. Clare, visited October 6th.—This is a new rain station on the coast, not 100 yards back from the cliff. Miss Bowes, the observer, takes great pains.

Hazelwood, Quin, Co. Clare, visited October 7th.—Also a rain station. The gauge is in the garden, rather sheltered, and Mrs. Hallam Studdert, the observer, fears its being stolen if placed in an open field. I have recommended its being placed in front of the house.

Valencia, visited October 10th.—I found the instruments in very good order.

Roche's Point, visited October 11th.—The station is, as usual, in very good order.

Kilkenny, visited October 12th.—This is a weekly weather report station. Lord Ormonde takes the readings when he is at home. The instruments are in good order.

St. Ann's Head, visited October 13th.—The instruments are in order at this station. The observer, Mr. Knott, is to be removed on promotion, in a few days. His successor, Mr. Dunsford, wishes to have a second observer appointed, to share the responsibility with him.

Tenby, visited October 14th.—The old observer, Mr. Balmer, left in June, and his successor is Mr. R. J. Truscott, a consulting oculist, son of a local optician. He seems quite capable. The thermometers and rain-gauge are shortly to be removed from the private garden where they now are to a plot of ground belonging to the Corporation. This will be an improvement, but the new site is not unexceptionable, though no more open space is to be found at Tenby.

Corrections for the Thermometers at the Stations.

Stations.	Inspector's Standard.	Dry Bulb.	Wet Bulb.	Max. Thermometer.	Min. Thermometer.	Grass Min.	Spare Thermometer.	Remarks.
Belfast (Queen's College).	° —	° —	° —	° —	° —	° —	° —	Examined at Kew, June, 1899.
Blacksod Point ..	54·8	−0·7	−0·6	+0·1	−0·6	—	—	..
Donaghadee ..	55·7	−0·5	−0·6	−0·3	+0·3	—	−0·3	
Edenfel (Omagh)	51·9	—	—	0·0	−0·1	—	−0·6	
Glasnevin	52·1	−0·6	−0·5	0·0	+0·1	+0·8	—	
Holyhead	53·2	−0·6	−0·2	+0·4	+0·1	—	−0·5	
Kilkenny	54·9	—	—	−0·1	0·0	—	—	
Londonderry ..	54·3	−0·7	−0·7	+0·2	+0·3	—	—	
Malin Head ..	54·0	−0·3	−0·3	−0·2	−0·9	—	−0·8	
Markree	51·8	−0·3	−0·2	−0·4	+0·5	—	—	
Newcastle (Co. Wicklow).	55·4	−0·6	−0·7	+0·2	−0·5	—	—	Spirit separated in minimum.
Parsonstown ..	54·2	−0·7	−0·1	0·0	+0·1	—	—	For 9 a.m. and 9 p.m.
Ditto ..	—	—	—	−0·6	+0·1	—	—	For telegraphic reports.
Roche's Point ..	55·0	−0·4	−0·4	−0·1	+0·2	—	−0·8	
St. Ann's Head ..	52·2	−0·8	0·0	+0·1	−0·5	—	−0·6	
Tenby	52·1	−0·4	−0·4	−0·1	+0·1	0·0	—	
Valencia	58·0	−0·8	−0·7	−0·4	0·0	—	0·0	

Report by Dr. Buchan.

Scottish Stations.

Barometers.

The barometers at the stations were compared with inspector's standard barometer No. 690, which continued to be in good order during the inspection. The station barometers were all found to be in good order.

Table I. gives the comparisons of the readings of No. 690 with the readings of the various station barometers.

TABLE I.

STATIONS.	Inspector's Standard No. 690 corrected.	Reporting Barometer uncorrected.	Check Barometer uncorrected.	REMARKS.
	Inches.	Inches.	Inches.	
Ochtertyre	29·872	29·858	—	
Fort William .. .	30·295	30·290	—	
Fort Augustus	30·290	30·288	—	
Stornoway	29·831	29·826	broken.	
Strathpeffer	29·309	29·307	—	
Wick	29·884	29·884	29·863	
Dunrobin	30·195	30·194	—	
Lairg	29·764	29·750	—	
Nairn	30·274	30·274	30·274	
Kingussie	29·484	29·486	—	
Gordon Castle	—	—	—	Barometer under repair.
Aberdeen	30·119	30·115	—	
Edinburgh	29·130	29·135	—	
Leith	29·370	29·368	29·367	
Rosewell	28·760	28·752	—	
Glasgow	28·890	28·894	—	
Pinmore	29·229	29·230	—	
Dundee	29·612	29·610	—	

THERMOMETERS.

The thermometers were read twice, first, by the observers immediately on opening the thermometer screen where they are hung, and then by the inspector after being in water along with standard thermometer for the times specified in the table. Particular attention was given to the action of the maximum thermometers, and also to the state of the minimum thermometers.

As regards the latter at Rosewell, fully a degree of the spirit was lodged near the top of the tube, under the rather thickish guard. This the observer, under direction, rectified.

TABLE II.

STATIONS.	Inspector's Standard No. 4483.	Dry Bulb.	Wet Bulb.	Max. Thermometer.	Min. Thermometer.	Spare Thermometer.	Time in Water.	Change of Temperature.	
	°	°	°	°	°	°	min.	°	
Ochtertyre ..	56·4	0·0	−0·1	0·0	−0·1	—	130	0·0	B B. Min. 0·0°
Fort William ..	65·0	+0·1	+0·1	0·0	0·0	—	140	0·0	
Fort Augustus ..	65·4	+0·1	+0·1	+0·2	−0·5	—	135	0·0	
Stornoway ..	64·1	+0·7	+0·7	−0·2	0·0	—	135	+0·3	
Strathpeffer ..	58·6	0·0	0·0	0·0	+0·1	—	75	−0·2	
Wick	57·7	+0·4	+0·5	0·0	−0·1	—	80	−0·3	
Dunrobin	58·9	0·0	0·0	+0·1	+0·1	—	140	+0·3	
Lairg	55·1	+0·1	0·0	−0·1	0·0	—	75	+0·2	
Nairn	60·4	+0·7	+0·7	+0·2	−0·3	0·0	65	+0·2	
Kingussie	62·2	+0·2	+0·1	−0·3	−0·3	—	80	0·0	
Gordon Castle ..	61·2	+0·1	0·0	0·0	−0·1	—	60	+0·3	
Aberdeen	61·3	+0·1	+0·1	+0·1	+0·1	—	95	0·0	
Edinburgh ..	56·1	+0·2	+0·2	−0·4	0·0	—	90	+0·2	Min. on Grass 0·0°
Leith	57·3	+0·2	+0·3	0·0	−0·4	—	60	0·0	
Rosewell	53·0	−0·3	0·0	+0·1	−0·2	—	130	0·0	Min. on Grass −0·1°
Glasgow	52·3	−0·3	−0·1	—	—	—	205	+0·2	Min. on Grass −0·2°
Pinmore	51·7	0·0	+0·1	−0·2	−0·1	—	120	+0·2	
Dundee	52·0	−0·5	−0·4	+1·3	+0·3	—	80	0·0	

HYGROMETERS.

The dry and wet bulb thermometers were in all cases read immediately on opening the thermometer screen, with the gratifying results that the readings well represented the hygrometric condition of the air at the time.

NOTES OF INSPECTION OF THE STATIONS.

Ochtertyre, August 7th, 1899.—The instruments were in excellent order, and the observations continue to be made with fulness, care, and much enthusiasm. Observations of underground thermometers are made five times daily.

Fort William, August 10th, 1899.—The instruments are in excellent order, and the observations are made with care, correctness, and punctuality. The maximum and the minimum

thermometers kept in the screen for photographic purposes were also examined, when the readings were :—

Maximum thermometer	...	...	0·0°
Minimum thermometer	...	...	—0·9°

This minimum thermometer appears to read lower every year, as if there was a slow leakage somewhere. A new one is required to replace it.

Fort Augustus, August 11th, 1899.—All the instruments were in very good order, and the greatest care is given to secure fulness and accuracy in the observations. Clouds are very fully observed as regards their species, velocity, and direction of movement, together with their heights on the surrounding mountains; and the height of snow on the hills is also noted.

Stornoway, August 15th, 1899.—The irregularities in the curves of the barograph have been occasioned by the clock being out of order. This is now rectified. The rack of the barometer slips down unless when kept up by the hand. The spare barometer taken to this station last year is broken. It is desirable that two new barometers, and a dry bulb and wet bulb hygrometer, and a thermometer screen be sent to Stornoway. So far as possible to the observer, the instruments are kept in good order, and the observations, particularly of the wind, are made with admirable care and skill.

Strathpeffer, August 16th, 1899.—A new rain-gauge was added some time ago, and was at once to be placed in a better position than the old one. Both gauges were read for some months together. The instruments are well attended to, and much care and attention is given to the observations.

Wick, August 17th, 1899.—The instruments are in good order, and Miss Sinclair, on whom the work of observing chiefly falls owing to the declining health of her father, makes the observations with intelligence and care.

Dunrobin, August 18th, 1899.—The instruments were in very good order, and the observations are made with much intelligence and care.

Lairg, August 19th, 1899.—The instruments were in excellent order, and the observations are made with accuracy and punctuality.

Nairn, August 21st, 1899.—The instruments were all in excellent order, and much care, expertness, and accuracy shown in making the observations.

Kingussie, August 21st, 1899.—The instruments are all good, and well attended to, and Dr. W. de Watteville is an intelligent and singularly accurate observer. He is assisted by the local chemist with the observations of the wind, which are made at 8 a.m. and 4.30 p.m.

Gordon Castle, August 23rd, 1899.—The barometer here had been sent to Aberdeen for repair, where I saw it on the 26th, and as the tube required to be reboiled it was forwarded to Edinburgh. Otherwise the instruments were in very good order, and the observations continued to be well attended to.

Aberdeen, August 24th, 1899.—All the instruments were in excellent order, and the observations are made in a manner leaving nothing to be desired. An earlier despatch on Sundays of the telegraphic report to London is promised. The following readings of thermometers in screen of the observatory were made: maximum, 61·8° ; minimum, 61·4°, the standard being at the same time 61·8°.

Edinburgh, September 18th, 1899.—A new soil thermometer for a depth of 3 inches had just been added to replace one that had recently been broken. The instruments were all in excellent order, and the observations are made with the greatest care and accuracy.

Leith, September 19th, 1899.—The wet bulb was very well moistened, but, as the cloth was somewhat dirtied with the dust of Leith, it was recommended that it be changed every fortnight. The rain-gauge, which is getting old, was deformed, and the observer was instructed to get it put right, otherwise the instruments were in fairly good order. Mr. Richardson, the chief observer, had been confined to the house through illness for some time. At this station a good deal of care and attention are given to the observations.

Rosewell, September 22nd, 1899.—About 1·5° of the spirit of the minimum thermometer was lodged near the top of the tube, concealed under the rather thickish guard. This was, under direction, rectified by the observer. Otherwise the instruments were in very good order, and the observations are made with accuracy and fulness, and, it may be added, that the figuring in the schedules sent is exceptionally good.

Glasgow, September 26th, 1899.—The instruments were all in excellent order, and the observations continue to be made with great care, skill, fulness, and accuracy. An electric light is used in reading the barometer.

Pinmore, September 27th, 1899.—The instruments were in very good order. Mr. Donald, the observer, is seriously ill, but still takes a general charge of the observations, which are now made by his son who is a remarkably good observer.

Dundee, September 29th, 1899.—The instruments were in very good order, and the observations continue to be made with much care and accuracy.

Report by Mr. F. Gaster.

Arlington Court, North Devon. Inspected on October 10th.—This is at present only a weekly weather report station, as far as this Office is concerned, but there are also dry and wet bulb observations taken daily from instruments *well* exposed in a Stevenson's screen, and a barometer. The error of this instrument I could not ascertain as I had no standard with me at the time.

The exposure is very good, there are two gauges, and everything (excepting the wet bulb mounting) was in perfect order.

Prawle Point, visited on October 11th.—I brought the instruments away from this station. They were all in good order, excellently exposed, and the wet bulb was properly mounted.

Plymouth, Second order station. Inspected on October 12th.—Instruments in remarkably good order, very well placed, and their indications carefully recorded.

Hurst Castle, visited on October 14th.—From this station also I brought away all the meteorological instruments—the station being no longer required.

Totland Bay, visited on October 16th.—This is a second order station. Since last inspection, the instruments have all been removed to a new position, about 50 feet higher than the old house. Their exposure is admirable, and the greatest care is taken by the observer, in order to ensure accuracy and promptitude. After dismounting the wet bulb for verification, the observer himself remounted it quite accurately.

Corrections for Barometers.

Stations.	Reading of Standard.	Correction to Observer's Bar.	Notes.
		in.	
Plymouth	29·580	—·004	Observer's Bar No. 214.
Totland Bay	29·789	—·002	„ „ No. 565.

Corrections for Thermometers.

Stations.	Dry.	Wet.	Maximum.	Minimum.	Spare or Grass.	Standard No. 583.	Notes.
						°	
Arlington Court..	—	—	—0·2	+0·2	—	53·6	
Plymouth	0·0	—0·1	0·0	+0·5	—0·3	56·0	Correction to grass minimum verified.
Totland Bay ..	—0·6	—0·1	0·0	+0·4	—0·2	53·9	

Report by Mr. R. H. Curtis.

Telegraphic Reporting Stations.

Scilly.—At this station the stems of both the maximum and minimum thermometers were loose upon their frames, and as they are not divided upon the stems an error was always possible, which in the case of the minimum might exceed a degree. The errors of the instruments were determined after the stems had been secured. The can of the rain-gauge leaked badly, and I had it soldered. The deputy observer here has recently come from Malin Head, where he was the observer for the Office, and he is therefore quite familiar with the work.

Bidston.—Mr Plummer was away from home, but his assistant showed me the instruments. A new rain-gauge was recently substituted for the one previously in use, but no other alteration had been made in the equipment of the station since last inspection. The thermometer screen used here is not of the usual pattern adopted by the Office.

Stations of the Second Order, and Weekly Weather Report Stations.

Edgbaston.—This station was in excellent order, and the observer is keenly interested in the work. The position of the sunshine recorder could not be better than it is. The observer is willing to send a weekly return of sunshine if it is desired, and if the necessary forms are sent to him.

Shirley.—The instruments here are well-placed and were in very good order; the rain-gauge required to be made firm.

Cronkbourne, Isle of Man.—The index of the minimum thermometer does not always come back with the spirit, and the instrument requires to be carefully watched; but with this exception all was in perfect order, and the station is very carefully attended to. Rainfall stations are about to be established amongst the hills of the island.

Lytham.—The instruments have been removed to the Park, where they have an excellent exposure; there is, however, no barometer capable of giving accurate readings. Dr. Jenkins has been away for some months, and in his absence the observations are made by Dr. Birch.

Newton Reigny.—The observer here had intended to discontinue his observations in October, but in view of the fact that the Office is otherwise quite unrepresented in the district he has agreed to continue the station for Weekly Weather Report purposes. He was away from home when I called, but his instruments are good, and are well-placed, and the observations appear to be carefully made.

Aysgarth.—The observer was away and his house let during his absence. The observations were being taken by the Rev. Mr. Remington, in the village, about a mile distant from Mr. Stow's

house. I took particulars as to this temporary site and the instruments in use.

Skipton.—Everything at this station was in perfect order, and great care is taken with the observations. Up to now no arrangements have been made for evening observations.

Darwen.—The barometer here has been repaired since last summer, but owing to an accident to my standard I was not able to verify it. The minimum thermometer had been broken not long before my visit. The station is well-equipped with instruments, which appear to be carefully attended to.

Manchester.—The instruments here are all in good order, and the observations appear to be made carefully. Some further observations asked for will be supplied in future.

Prestwich.—Here also the condition of the instruments and the care bestowed upon the observations leaves nothing to be desired.

Sheffield.—The thermometer screen was very dirty, but is to be repainted at once, and this will in future be regularly done once a year. All the instruments were in good order, and are carefully observed.

Anemometer Station.

Scilly.—The *Robinson Cup* Anemometer was in fair condition but the top bearing of the cups was quite dry. The arrow head and the tail of the vane were both a little loose, and I therefore inserted lead washers and screwed them up tight. All the parts were cleaned and oiled, including the clock, and left working in a very satisfactory manner.

The *Pressure-tube* anemometer was in good order except that the water-level was too low, giving rise to an error of two miles in all the curves, and that the pen was dirty and clogged. I pointed out to the observer the importance of watching both these points. The vane worked very freely and I therefore did not dismount it, but I showed the observer how to do so in case of necessity, without using a ladder, as he has hitherto done. The water in the container showed a very slight white deposit. Since my visit to this date the traces have shown considerable improvement, and there have been no losses of record.

I looked carefully to see whether it was likely that the works now being carried out close to the anemometers would be likely to affect their records. At present it cannot be seen to what extent this will be the case when the works are completed, but I do not think their effect will be great, as the works are rather below the highest part of the hill; in any case the pressure-tube will not suffer. Temporarily there are some sheds, and heaps of debris, &c., which are level with the cups of the Robinson instrument; and since they are not many yards away the wind, when it blows from their direction, must be influenced by them. But they all lie between S.S.E. and S.W. from the anemometers, and I was told that within the next twelve months they would probably be removed. From S.W. through N. to S.S.E. the exposure is, and will remain, as it always has been.

CORRECTIONS FOR BAROMETERS.

STATION.	Standard corrected.	Reporting Barometer.	Check Barometer.	Difference Standard—Reporting.	NOTES.
	ins.	ins.	ins.	ins.	
Scilly	29·874	29·878	29·870	– ·004	
Edgbaston ..	·665	·666	..	– ·001	
Cronkbourne ..	29·820	29·820	..	·000	Owing to breaking of the Standard no barometer comparisons could be made at stations subsequently visited.

CORRECTIONS FOR THERMOMETERS.

STATION.	Inspector's Standard.	Corrections found for:—						NOTES.
		Dry Bulb.	Wet Bulb.	Spare Thermometer.	Maximum Thermometer.	Minimum Thermometer.	Grass Minimum.	
	°	°	°	°	°	°	°	
Scilly	62·0	–0·7	–0·5	—0·1	–0·7	–0·3	—	
Edgbaston ..	60·7	–0·6	–0·5	—	–0·2	0	+0·2	
Shirley ..	65·8	—	—	—	–0·2	+0·1	—	
Bidston ..	62·0	0	–0·5	—	–0·1	–0·1	—	Maximum and minimum read at 8 a.m.
	—	—	—	—	0	+0·4	—	Maximum and minimum read at 9 a.m.
Cronkbourne	55·5	–0·6	–0·7	—	–0·1	+0·2	+0·3	The index of the minimum is apt to get left behind by the spirit.
Lytham ..	60·2	–0·5	–0·2	—	0	+0·1	—	
Newton Reigny.	54·5	—	—	—	–0·5	–0·1	—	
Aysgarth ..	51·8	–0·2	–0·4	—	–0·3	–0·2	—	These instruments were being used by the deputy observer, but I gathered they are not those used by Mr. Stow himself.
Skipton ..	50·9	–0·1	–0·1	—	0	0	+0·2	
Darwen ..	48·0	0	0	–0·8	0	—	+4·5	A large amount of spirit at top of tube of grass thermometer.
	—	—	—	—	—	—	+1·0	Correction after spirit had been removed.
Manchester ..	56·8	–0·2	–0·2	—	+0·5	0	0	
	64·5	—	—	—	+0·5	—	—	Second trial, in warmed water.
Prestwich ..	57·3	–0·5	–0·3	—	–0·2	–0·2	–0·2	
Sheffield ..	55·0	–0·4	–0·5	—	–0·2	–0·2	+0·1	

Holyhead Anemometers.

Robinson Anemometer : Removal to new site on Salt Island

The stand, which had been already erected by Mr. F. Cotton, C.E., the Harbour Engineer, is in every way satisfactory. It is perfectly rigid—some additional struts having been inserted near the base to further secure this end ; its exposure is good and it is so arranged as to afford ready access to the exterior portion of the anemometer ; whilst the hut below for the accommodation of the recording apparatus is commodious and well lighted.

Every part of the anemometer was very carefully examined and found to be in good condition, those which had required repair having been to Munro's for the purpose. Every section, including the clock, was cleaned before being put in its place, and after re-erection the instrument yielded very satisfactory traces. Points for use in orienting the vane were determined and afterwards again verified.

The height of the platform upon which the base of the exterior portion of the anemometer rests is 20 feet above the ground, and the centres of the cups are 4 ft. 6 ins. above the platform. The hut is about 25 yards south of the Bridled and other two anemometers, and the ground level being a little higher, the cups are about 4 feet higher above sea level than the pressure-plate erected in 1897.

By reference to the vanes of the pressure tube and pressure plate anemometers it was quite apparent that the windmill vane did not point correctly to the "eye of the wind." I had suspected this before (Minutes 1894–95, p. 37), and I now adjusted the pencil so that it should record the direction indicated by the pressure-tube vane, which was pointing North when the windmill vane pointed N.N.W. I was able to test it with fresh winds, from S.S.E. through West to North, and found the error of two points constant throughout.

Bridled Anemometer.

This instrument was dismounted and cleaned, and found to be in very good condition. The traces obtained are good, but the reservoir of the wheel-pen in use had a slight leak, which had to be made good. The cups were quite free from the indentations which have generally been found in previous examinations.

Pressure Tube Anemometer.

The only point calling for notice in this instrument was the continued corrosive action which was taking place in some of the joints. The float was in perfect order, but the lower part of the cover had become so bad as to make re-soldering absolutely necessary, and there was also a trifling leak at the bottom of the "container," which, however, was readily stopped by red lead. As I could not get the cover done during my stay I left instructions with Mr. Davis, who will get it done at once. The vane was working quite freely.

Pressure-Plate Anemometer.

The head of this instrument was taken down and carefully examined. I found the lignum vitæ bearings had effectually stopped the grinding, which was at first such a source of trouble. It was evident, however, that the tube carrying the plate ought to have been square instead of round. This would have prevented the tendency to revolve, which seems to be due to slight inequalities of pressure upon the plate, and results in some friction being put upon the pulley which carries the chain leading to the spring, the top of which works within the tube.

The aluminium tail to the vane was too flexible, and I therefore stiffened it by two thin strips of yellow pine which I screwed along its upper edge. I also put upon a rod, which projects beyond the tube, a small grooved wheel to work against the lower edge of the vane, so as to assist in preventing the tube from revolving.

The wire cord leading from the chain to the spring was unsatisfactory, because it was impossible to free it from "kinks." A chain right through would no doubt be the best thing, except that its weight would be fatal to records of moderate winds; I therefore got and fixed a good whip cord, the only objection to which is its hygroscopic nature, but I think it will be easy, by soaking it in boiled linseed oil, or some similar medium, to get over this difficulty, and I anticipate better results by its use.

I altered the pawls of the ratchet so as to give readings to *half a pound*, instead of to pounds only as before.

The first hut, and all the exterior iron work of the three anemometers adjoining it, is much in need of repainting, and I therefore asked Mr. Cotton to have this done.

It is only due to Mr. Davis, the observer, to report that he keeps his instruments in excellent order.

With reference to the error in the Holyhead windmill vane, the question arises as to how far the indications of instruments of this form can be accepted as correct until each has been tested in some way. Up to the present time I believe this has never been done. Mr. Munro tells me that no actual test is applied to them by him, beyond taking care in their construction; the Holyhead instrument, however, was not made by him but by Beck.

Report by Mr. John A. Curtis.

Bawtry, Hesley Hall, October 5th.—I found everything in good order at this station, and the observations are, I believe, carefully and intelligently attended to.

Durham, October 2nd.—Mr. H. J. Carpenter, F.R.A.S., has now left the observatory, and the new observer (who has been an assistant to Prof. Turner, at Oxford, for two years) had not yet

come into residence. I, however, saw Prof. Sampson, the Director of the observatory, who was acting as interim observer, and went over the details of the work with him. All the instruments were in good order except that the grass minimum had about 5° of detached spirit, which I corrected. A Stevenson screen has been obtained to replace the Glaisher stand at present in use. I selected a position for the new screen, and asked that observations may be taken in both screens for a time. This, it was promised, should be done.

Felixstowe, September 21st.—This is a new weekly weather report station. The observer, the Rev. J. G. Munday, was from home, but I saw the Rev. W. Ward, the deputy observer. The instruments are good and are well exposed, but the rain-gauge was not firmly fixed, and the wet-bulb (the observations from which, though regularly taken, are not sent to us) was not properly mounted. The sunshine recorder (a Jordan) is fixed on top of the Stevenson screen, and will lose a little sunshine in the early summer mornings, and *possibly* a little in the winter, about 11 a.m. I think the observations represent Felixstowe very well.

Fulbeck, September 28th.—All the instruments were clean and in good order at this station, and the work is very carefully done, though not with quite the same minuteness as at some other stations. The observer, the Rev. Vere F. Willson, M.A., takes great interest in the observations, especially in those of rainfall.

Geldeston, September 23rd.—Everything was in perfect order at this station, and the observations are conducted with the utmost care and accuracy.

Hollesley Bay, September 22nd.—Both the instruments and their exposure at this station leave nothing to be desired, and Prof. Thonger attends to the work with great care and enthusiasm. The maximum thermometer, however, has a large error owing to the separation of a portion of the mercury, which I quite failed to reunite. The observer had been applying a correction of + 1·5 for this, but I gave instructions to use + 2·0 in future.

Ketton, September 26th.—This is a new weekly weather report station, in succession to Duddington, some three miles distant. The observer (Mr. Fred. Coventry) and the instruments are the same, and the position of Ketton with regard to the valley of the Welland is so like that at Duddington that the one station may well be accepted as a continuation of the other. The instruments were clean and in good order, and their exposure is also good. Mr. Coventry takes great interest in the work.

Ketton Hall, September 26th.—This is a rainfall station, with a new observer. The gauge was firmly fixed, but the measuring glass was not quite clean, neither did it agree very exactly with the one supplied to me as standard. The difference however will not appreciably affect the record, and I made no change.

Ketton Vicarage, September 26th.—This is a new rainfall station. The gauge stood on a small lawn in front of the house, and was much sheltered by walls and trees. I recommended its

removal to a position—which I selected—on the edge of the lawn at the back of the Vicarage, where the exposure will be much improved, and the observer promised that this should be done.

Lowestoft, September 25th.—I was asked to report as to the sunshine recorder at this station. I found the instrument clean, in good order, and very carefully attended to. The exposure is certainly good, and is probably the best that can be obtained in Lowestoft. Some trees, however, interfere to a certain extent, and if these could be topped, it would be an advantage.

Morpeth, October 4th.—The instruments at this station were all in very good order, and Mr. Berry, the observer, is most painstaking and careful. The exposure of the instruments is excellent.

Newcastle-on-Tyne, October 4th.—Everything was in good order here. The outfit of instruments is very complete, including as it does a *Richard* barograph and thermograph, a sunshine recorder, and a small dial anemometer. The observations are taken with care and intelligence.

Scarborough, September 30th.—I was asked to report on the sunshine recorder. I found the instrument exposed on a wooden platform, 2 feet square, fixed on the ridge of the roof of the observer's house. The exposure, though not perfect, is certainly very good. The ball was not central in the bowl, but this I was able to correct. The wooden platform warps with changing weather, and the observer has applied to have a stone slab fixed in its stead. This will be a decided improvement.

Seaham, October 3rd.—Everything was in good order, and the observations are carefully made and reduced. Owing to the extension of the railway the present position of the thermometer screen and rain-gauge will become unsatisfactory. I therefore selected and marked out new positions in the same plot of land for use when required.

Spurn Head, September 29th.—The principal light-keeper had just been changed, and the new observer, Mr. A. Badcock, who came to Spurn on September 16th, had had no previous experience in reporting for the Office. I therefore went over the details of the work carefully with him, and I think he will prove to be a satisfactory observer. His minimum thermometer was altogether out of order, but I reunited the spirit and showed him how to proceed in any similar case in future. Owing to the constant drift of sand the thermometer bulbs are now too near the ground, the dry-bulb, wet-bulb and minimum being only 3 feet 4 inches from the surface. I recommend that instructions be given to have this altered.

Temple Bruer, September 28th.—This is the new rainfall station on Lincoln Heath, which has been established by the Rev. V. F. Willson, of Fulbeck. Miss Morley, the observer, was ill at the time of my visit, but I saw her brother. The station is about two miles from and 30 feet lower than the western edge of the Heath, in a very open situation, with but few trees. The gauge is placed in a kitchen-garden, and I impressed on

Mr. Morley the importance of taking care that no high crop was allowed to shelter it. He promised that, as now, it should be kept freely exposed.

Tixover Hall, September 26th.—This is a new rainfall station. The gauge is a new one, 5-inch, and is excellently exposed on the open lawn to the north of the Hall. It was not quite firmly fixed, but Mrs. Hotham (Capt. Hotham, who personally attends to the instrument, was from home) promised that this defect should be at once remedied.

Uppingham, September 27th.—The late observer, the Rev. G. H. Mullins, M.A., having left Uppingham, I called on Mr. C. H. Jones, the Master who had temporarjly undertaken the work. I found, however, that owing to pressure of other duties Mr. Jones was unable any longer to continue the observations single handed, and that therefore they had now ceased.

Corrections for Barometers.

Stations.	Reporting Barometer.	Check Barometer.	Remarks.
Durham	—	—	Standard deranged.
Fulbeck	+ ·005	—	
Geldeston	+ ·010	—	
Hollesley Bay	+ ·002	—	
Morpeth	+ ·015	—	
Newcastle-on-Tyne	+ ·018	—	
Seaham	—	—	Standard deranged.
Spurn Head	+ ·017	+ ·019	

Corrections for Thermometers.

Stations.	Inspector's Standard.	Dry Bulb.	Wet Bulb.	Maximum.	Minimum.	Grass Min.	Spare.	Remarks.
		°	°	°	°	°	°	
Bawtrey	50·3	−0·2	0·0	−0·3	−0·2	—	—	
Durham	47·4	−0·6	−0·5	−0·5	+0·3	+0·5	—	
Felixstowe.. ..	58·0	+0·1	+0·2	+0·2	+0·2	—	—	
Fulbeck	57·7	−0·3	−0·4	−0·2	−0·1	—	—	
Geldeston	56·0	−0·6	−0·8	−0·4	0·0	—	−0·6	
Hollesley Bay ..	59·1	−0·1	−0·1	+2·0	+0·3	+0·2	—	
Ketton	56·2	0·0	+0·6	−0·1	+0·1	—	—	
Morpeth	53·5	−0·2	0·0	−0·1	+1·1	0·0	—	
Newcastle-on-Tyne.	54·9	−0·2	−0·2	−0·2	−0·1	—	—	
Seaham	65·9	−0·9	−0·9	+0·9	+0·2	—	−0·8	
Spurn Head ..	55·8	−0·3	−0·1	−0·2	+0·5	—	—	

Report by Mr. F. J. Brodie.

Stations of the Second Order.

Eastbourne, September 23rd.—Everything at this station appeared in a very satisfactory state. The observer had been in the habit of setting the vernier of the barometer too low, but will in future conform to the usual practice. Mr. Sheward hopes shortly to train a deputy observer.

St. Leonards, September 25th.—The instruments were all in a good condition. Since last year a new Stevenson's screen has been set up. A new sunshine recorder has also been procured, the glass ball of the old one having been found to be in an unsatisfactory state. The new recorder has been placed above and immediately behind the old one, which still remains in position.

St. Leonards, West Marina, September 25th.—Observations of temperature and rainfall only are made at this station. The instruments were all in good order, and the observer, Mr. Eldridge, seemed careful and intelligent.

Littlestone-on-Sea, September 26th.—This is a station to be presently established by Mr. H. T. Tubbs, who had already been in correspondence with the office on the subject. On my way to Dungeness I called upon the man who would in all probability be the acting observer, and selected sites for the various instruments. I suggested that the sunshine recorder should be placed on the top of the water tower. This would also form an excellent position for an anemometer.

Chatham (*School of Military Engineering*), September 28th.—The rain-gauge here is of the Glaisher pattern, with a short curved delivery tube, and the receiving can seemed to be too small to catch all the rain unless placed with great care in the centre of the gauge. I advised the use of a larger can, and Major MacDonnell promised that one should be procured. The readings of the minimum thermometer, which were for some time entered to the day preceding that of observation, are now correctly inserted, the change commencing with January 1st of this year.

Rochester, Rede Court, September 29th.—Everything here was in a most satisfactory condition, and the observer evidently takes very great interest in the work.

Maidenhead, September 30th.—This is a new station, and had not hitherto been inspected. The instruments are good, but the thermometer screen is only a single louvred structure of the observer's own make. It is too small, and is placed close to a hedge. I strongly urged the importance of getting a Stevenson's screen, and selected a better site for it, but the observer was about to start shortly for Egypt, and said that no change could be made until his return, in about three months time.

Harpenden, October 2nd.—The two terrestrial radiation thermometers read much too low, but the cause of the error was not evident. The screen is still an enlarged "Stow," and is not very firmly fixed.

Telegraphic Reporting Stations.

Jersey (*St. Aubins*), September 18th.—The wet-bulb thermometer read nearly a degree and a half too high, and I therefore directed the observer to substitute for it the spare thermometer. Some time was spent in explaining the kind of "remarks" we required in the daily telegrams. The position of the sunshine recorder at Fort Regent had not been changed, and the instrument appeared to be properly looked after by Gunner Wright.

Dungeness, September 26th.—The instruments here were in a good condition, and the observer, Mr. Grimmer, seemed careful and intelligent. In order to test very carefully the accuracy of the barometers I employed as the standard an instrument with an uncontracted tube, and while at the station took observations at intervals of half an hour. A mean of eight observations showed that the reporting barometer (No. 618) read ·015 inch lower, and the check barometer (No. 619) ·011 inch lower than the standard, the readings being in every case corrected for index error. The weather at the time was squally, and the mercury was "pumping" a good deal.

Weekly Weather Report Stations.

Rothamsted, October 2nd.—The sunshine recorder and rain-gauge were in a satisfactory state. The thermometers in use are those employed for Harpenden (*see* notes on Second Order stations).

Sunshine Stations.

Emsworth—Watergate Park, September 22nd.—No change had been made in the exposure of the recorder since last year. Rainfall records are also supplied from this station. A Stevenson's screen has recently been procured, with maximum and minimum thermometers, but no dry and wet.

Emsworth—Westbourne Rectory, September 22nd.—This is a Jordan recorder, the exposure being fairly good, but slightly interfered with in the early mornings and evenings by trees. The recorder is placed under a glass shade, which I pointed out was unnecessary.

Worthing, September 22nd.—This station had not previously been inspected by this Office. The recorders (there are a Stokes and a Jordan) are on the roof of a house (the property of the corporation) in Chapel Road. The exposure is upon the whole good, though somewhat interfered with by trees in the early mornings about midsummer. Dr. Kelly seems to take great pains to tabulate the cards accurately.

Rainfall Station.

Sandgate, September 27th.—The position of the gauge at this station had recently been changed. Its exposure is now good but the gauge was simply placed upon the border of a garden path. The observer was strongly urged to have it firmly fixed as soon as possible.

Corrections for Barometers.

Stations.	Inspector's Standard corrected. (No. 861.)	Reporting Barometer uncorrected.	Check Barometer uncorrected.	Reporting Barometer. Correction required to reduce to Inspector's Standard.	Remarks.
	ins.	ins.	ins.	ins.	
Eastbourne ..	30·056	30·056	—	0·000	
St. Leonards ..	29·739	29·732	—	+·007	
Rochester ..	29·535	29·534	—	+·001	
Maidenhead ..	29·281	29·269	—	+·012	Reporting barometer can only be read to hundredths of an inch.
Harpenden ..	29·272	29·25	—	+·022	
Jersey	30·050	30·042	30·038	+·008	
Dungeness ..	29·621	29·609	29·606	+·012	

Corrections for Thermometers.

Stations.	Standard corrected. (No. 5881.)	Dry Bulb.	Wet Bulb.	Spare Ther.	Max.	Min.	Grass Min.	Remarks.
	°	°	°	°	°	°	°	
Eastbourne ..	56·3	−0·1	−0·1	—	−0·1	+0·2	—	
St. Leonards ..	59·2	−0·8	−0·8	—	−0·4	0·0	—	
Do. West Marina	60·2	−0·4	−0·3	—	−0·2	+0·2	—	
Rochester ..	54·4	+0·1	0·0	+0·1	+0·1	0·0	+0·1	
Maidenhead ..	54·6	−0·4	−0·5	—	−0·4	+0·4	—	
Harpenden and Rothamsted.	52·1	−0·1	−0·1	—	−0·7	+0·1	+2·8	The observer was directed to substitute spare thermometer for wet bulb.
Jersey	62·3	−0·7	−1·4	0·0	−0·7	+0·1	—	
Dungeness ..	58·0	−0·3	−0·2	−1·2	−0·5	−0·1	—	

NOTE.—The rough notes containing the barometer and thermometer comparisons for Chatham were unfortunately lost.

Report by Mr. T. W. Baker.

Stonyhurst Observatory, September 20–21.—Both the barograph and thermograph at this observatory were in good order, and merely had their lenses cleaned and clocks oiled.

The exterior portions of the anemometer were dismounted and cleaned, and fresh sperm oil added to the bearings, but the clock and recording apparatus only required oiling; afterwards the orientation was examined and found correct.

The rain-gauge was also attended to, but the trace shown on the paper was rather coarse; this I partly rectified by altering the plan. A new pen and ink were much needed.

The thermometers were compared in water with the Kew Standard thermometer 720, and the following corrections determined:—

	°
Dry Standard, 619	— 0·1
Wet „ 382	— 0·3
Maximum, M.O., 1,525	— 0·1
Minimum, B.T., 501	+ 0·3
Grass Minimum, 265	+ 0·4
Attached thermometer to the Standard barometer, No. 696	— 0·7
Barograph thermometer, 339	— 0·4

Fleetwood, September 22–23.—Unfortunately at the time of my visit the weather was much too rough and stormy to dismount the external parts of the anemometer; indeed, Mr. Gaulter's men were quite unable to fix up the usual staging for taking down the instrument, although attempts were made to do so on both days.

The anemometer, however, was working very satisfactorily and seems to be well attended to.

I cleaned the clock and recording parts, but was only able to examine the orientation at the point from which the wind was blowing at the time of my visit.

Fort William, September 25–27.—The instruments at this observatory were found in good order. I dismounted the thermograph, cleaned the clock and lenses, and attached a new supporting line to the weight. Special attention was given to the action of the light stop. On examination it was discovered that the arm of the lever leading from the clock to the light shutter was slightly bent; this was corrected, and the action thereby greatly improved, and it is hoped that it will not give further trouble. The zero lines were changed from the summer to the winter position. The barograph clock was taken to pieces and cleaned, and the lenses received due attention.

With regard to the discolouration of the photographic sheets, which is attributed to impurities in the water at times of heavy rain, I find that there is no apparatus at the observatory for

distilling the water. If, however, a suitable tank was supplied, the rain water could be collected from the roof of the house and used for photographic purposes.

The rain-gauge was examined, and a new line fitted to carry the clock weight. Since the last inspection Mr. Rankin has adjusted and securely fixed the Sun recorder by cement on to its pedestal.

The various thermometers were compared in water at 55° by means of the Kew Standard thermometer 720, and the corrections found to be as follows :—

	°
Dry Standard, 671	0·0
Wet „ 672	— 0·2
Maximum, 1,092	0·0
Minimum, 1,322	+ 1·0
Thermometer attached to the Standard barometer, 7,222	— 0·3
Barograph thermometer, K.O., 690	— 2·1

NOTE.—The minimum thermometer reading rather low, I dismounted the tube from its frame and gently heated the chamber over a lamp ; after about two hours it was again tested, when the correction was found to be—

	°
Minimum, 1,322	+ 0·7

Armagh, September 29–30.—At this observatory the anemograph was in good order and all parts were found to be well lubricated.

The outside portions of the instrument were entirely dismounted and cleaned, and all the bearings supplied with fresh sperm oil. I also examined the clock and recording apparatus, and afterwards tested the orientation, which was found correct.

The rain-gauge received due attention, and "squeezes" were made of both the self-recording and spare rain funnels.

The Casella mercurial minimum thermometer having been reported to be out of order, I was requested by Dr. Scott to try and put it right. On examining the instrument I noticed that there was some air in the small pear-shaped chamber, which rendered the flow of the mercury uncertain. As I was unable to correct it, I brought the thermometer away, and sent it up to the Office with a letter on October 31st. In the meantime Dr. Dreyer is using an old Rutherford minimum, by Newman, in its place.

Valencia Observatory, October 3–6.—Here the instruments were found duly working in good order. First of all I dismounted the thermograph, cleaned the lenses and clock, and fitted a new line to the weight.

The photography was good, but Mr. Cullum drew my attention to the sheets, which were more or less discoloured, owing to stray light from the thermograph wet-bulb. I took out the tube and re-blackened the stem, and the curves which were afterwards

obtained showed that the stray light had been effectually blocked out. The dry and wet dots were not quite vertically one over the other on the drum, but this I put right.

The zero lines were shifted from the summer to the winter position.

The barograph was duly examined and the lenses carefully wiped ; the clock also was taken to pieces and cleaned.

The thermometers were compared and their corrections found to be as follows, at 55° :—

					°
Dry Standard,	399	...	...	...	— 0·7
Wet „	473	...	...	...	— 0·4
Maximum, M.O.,	1,003	...	...	...	0·0
Minimum	2,497	...	...	...	+ 0·5
Standard barometer attached thermometer, No. 71,062		...	...	...	— 0·1
Barograph thermometer (no number)			...		— 2·0

The minimum thermometer had a small quantity of spirit in its chamber ; this was set right, and the thermometer again tested after an interval of about an hour, when the following correction was determined—

				°
Minimum, 2,497	...	...	...	0·0

The anemometer was going well and the clock did not require special cleaning. I entirely dismounted the instrument on the roof and added fresh sperm oil to all the bearings ; afterwards the orientation was examined and found correct. The rain-gauge received due attention, and a new line was fitted to the clock weight. Mr. Cullum reported that the pen was very defective.

Mountjoy Barracks, Dublin, October 9–10.—Since the last inspection Colonel Hellard, R.E., has been succeeded by Major Sim, R.E., as the director of the Ordnance Office. Here I found the anemograph working satisfactorily, but the clock needed cleaning. This was duly performed, and the other parts of the instrument were cleaned and all the bearings oiled.

The orientation was tested and found correct, and the sheet accompanies this report.

The anemometer needed painting, and some new wire netting was required for the frames which are used to protect the grass minimum and solar radiation thermometers. Major Sim kindly promised to have these matters seen to at the earliest opportunity.

Falmouth, October 13–16.—The instruments were all in good condition, and the photography was excellent. I dismounted the thermograph and barograph, and cleaned both clocks and lenses and attached new cords to the weights.

The action of the barograph light shutter was improved by adding a small weight to the lever.

The zero lines were changed from the summer to the winter position.

A comparison of the various thermometers was made with the Kew standard, No. 720, and the following corrections determined:—

	°
Dry Standard, 383	− 0·5
Wet „ 738	0·0
Maximum, M.O. 104	− 0·5
Minimum, M.O. 308	+ 0·3
Barograph thermometer (no number) ...	− 0·9
Standard barometer attached thermometer (no number)	− 1·0

On dismounting the anemometer the oil in the direction well was found quite limpid, and the other parts of the instrument, were lubricated in a satisfactory manner. All parts were cleaned and the different bearings were supplied with fresh sperm oil.

Whilst cleaning the wheels of the reducing gearing I accidentally dropped the direction wheel down the hollow iron support of the anemometer. I had to get a carpenter to cut away the roof in order to recover the wheel, and to avoid any future mishap a wooden tray was fitted into the gearing box, which will prevent any screw or wheel from falling down the shaft again.

The orientation was duly examined and found satisfactory.

The rain gauge was taken to pieces and the clock thoroughly cleaned, and a new cord attached to the weight.

A new iron hook was got for holding the weight, and I had the stop, which is used for regulating the pen to the zero line, repaired by soldering.

The funnel of the spare gauge was not quite circular, but this was corrected.

Second Order Stations.

Mountjoy Barracks, Dublin, October 9–10.—The observer, Corporal Blackburn, who was away ill at the date of the last inspection, has since returned to his duties and is now regularly taking the observations. He shows great interest in the work, and reads the barometer and thermometers correctly. Some new wire netting is required for the frames which are used to protect the grass minimum and solar radiation thermometers from being interfered with by the jackdaws.

Major Sim undertook to have this done as soon as practicable.

The thermometers were tested and the following corrections found:—

	°
Dry bulb, B.T., 1925	− 0·6
Wet „ „ 1922	− 0·4
Maximum, B.T., 457	− 0·4
Minimum, M.O., 444	0·0
Grass minimum, M.O., 266	+ 0·1

Stonyhurst, September 20–21.—This observatory calls for no special remark, the instruments being in good order. The thermometers were examined and the following corrections found :—

						°
Dry bulb, 619 ...	...	...	...	...	—	0·1
Wet „ 382 ...	...	...	...	...	—	0·3
Maximum, 1525	...	...	...	...	—	0·1
Minimum, 501 ...	...	...	...	...	+	0·3

Armagh, September 29–30.—All the instruments here were in good order, with the exception of the Casella mercurial minimum (*see* p. 93).

The following corrections to the various thermometers were determined :—

					°
Dry bulb, B.T., 3256 ...	...	...	...	—	0·4
Wet „ „ 3254 ...	...	...	...	—	0·4
Maximum, 3404	...	...	...	—	0·9
Rutherford minimum (no number)			...		0·0
Grass minimum, M.O., 196 ...	...	...		+	0·6

Falmouth, October 13th–16th.—Here the thermometers, &c., were all in good order, excepting that the spare rain gauge funnel was not quite circular ; this was put right, and the thermometers were found to require the following corrections :—

					°
Dry bulb, 383 ...	...	...	...	...	— 0·5
Wet „ 738 ...	...	...	...	...	0·0
Maximum, M.O., 104 ...	...	...	...	—	0·5
Minimum „ 308 ...	...	...	...	+	0·3

Report by Mr. E. G. Constable.

Observatories and Anemograph Stations.

Yarmouth, July 28th–29th.—The anemometer here is apparently regularly attended to and oiled, as all parts were well lubricated, and the sperm oil was in excellent condition.

There was nothing in the exterior part of the instrument calling for special remark, it was thoroughly cleaned and new sperm oil supplied. Some parts of the wood scaffolding shew signs of dry rot at the base, and it would perhaps be well if the structure could be overhauled. The direction pencil has for some time past been "skipping" the trace, and I dismounted the frames and pencils,

but could not find any satisfactory cause for this defect, but every part was cleaned and carefully remounted, especial attention being given to the freedom of the cross clutches, and I am in hopes that the trace may be a little improved, but with this old type of recording pencil, lacking modern additions and improvements, I do not think that the traces are likely to be made perfectly satisfactory, but I did what I could in the matter.

The velocity shafting was noticed to have loosened somewhat. I took it down and found that one of the joint pins was partially cut through, this was rectified. The thin steel spring on the pricker had partially rusted away from its bed, it was made good, but the pricker arrangement is by no means of the best.

The orientation was examined and found satisfactory, and the check lines will be found on curves 209 and 211. The fusee spring clock decidedly wanted cleaning; this was done, the clock oiled, and a new pin fitted to the cylinder spindle.

About the middle of August I heard from Mr. Watson that the velocity trace was becoming blurred or thickened in places and that he could not remedy it, so I again visited this station on August 20th, on my way back from the North.

It was difficult to assign a definite reason for this development, but I attended to pencil and eased the marking where required, letting the instrument run for some hours between each attempt on 20th and 21st, and the subsequent traces were much improved, but to test this thoroughly a series of curves would be necessary.

North Shields, August 1st–2nd.—The Robinson anemometer here has been in the care of Mr. Robson for the past three months. I fully explained to him the working of the instrument, and the testing of the orientation, and this latter will now be done monthly if possible.

He apparently finds some trouble at present in starting the curves exactly to the required G.M.T., as owing to its confined position it is difficult to see the paper, but no doubt this little difficulty will disappear in time. The curves showed that the clock was slow each day, I altered the rating nut and asked Mr. Robson to further alter it when required. All parts of the instrument, both inside and outside, were dismounted and cleaned. The exterior portion was in good order and well lubricated, and the sperm oil for direction rollers fairly clean.

A new line was fitted to the clock, and the recording part was cleaned. The orientation was examined before and after touching anemometer, and was good.

Alnwick Castle, August 3rd–4th.—The Robinson anemometer here has not been taken down and overhauled for several years. I am pleased to say I was able this year to entirely dismount it, although considerable difficulty was experienced in doing so.

The oil, as might be expected, was thick and dirty, the rollers were not revolving freely on their bearings, and the face of one, probably through "jamming," has been slightly rubbed. The

direction tube could only be revolved with considerable pressure, and this must have tended of late to slow down the vane. The bearings, endless worm, and oil cup on the velocity shaft show no signs of wear, but the stays to the cup arms are beginning to perish, and to strengthen them I got the smith at the Castle to fit additional copper cross-stays.

All parts of the instrument were soaked in paraffin, thoroughly cleaned and freshly oiled, and left in good order.

The orientation—considering the large amount of "back-leash" due to the shafting—was good enough, and sheets showing the same are sent herewith. The sheets also have traces on the velocity division which show that the curves overlap the printed scale both top and bottom, thus confirming the accuracy of the traced copies.

I subsequently heard from Mr. Willyams that they could not get the velocity pencil to mark properly, probably owing to the shafting, and at his request I called again on August 19th, on my way South. I found the anemometer itself and the recording portion in good order, but the shafting was not revolving properly.

The rods and bevelled wheels were examined length by length, and the fault was finally located at the junction end of the long vertical tubing by the library wall. It was corrected as far as possible, but as I met with an accident by falling through an opening whilst testing the shafting under the roof, I was not physically capable of finishing it myself, and it was done by the smith. Since my return, I have been in communication on the subject with Mr Willyams, and in his last letter he states that the instrument is now in excellent order, and the curves sent me show that the pencil is now marking satisfactorily.

Aberdeen, August 7th–9th.—The various instruments at this observatory were in their usual good order. There was nothing calling for remark either in the barograph or thermograph; both clocks were cleaned, and the mirrors and lenses polished. The thermometers were compared with K. S. 720 at 61°, and the corrections required are given in the table. The anemometer was cleaned on August 8th. All parts were well lubricated, and the sperm-oil for the direction-rollers was fluid but rather dirty. Fresh sperm was put in. The instrument is in good order, excepting that the endless screw on the direction fan-spindle is beginning to show signs of wear, but at present the "back-leash" is not unduly large.

The orientation was satisfactory.

The Beckley rain-gauge has been shifted since my last visit to a more convenient and decidedly more suitable position in the college grounds, where it has a good exposure.

The clock, etc., was cleaned and oiled, and squeezes taken of both rain-guages.

Deerness, August 11th–12th.—I found the anemometer here well oiled and cared for. The cups, arms, etc., have been painted, as well as the hut—inside and out—and the enclosure for the sunshine recorder.

The sperm oil for the direction bearings although rather dirty was fluid; and according to Mr. Spence, showed a decided improvement upon the condition of the lubricant last autumn.

The new direction fan-spindle and lignum-vitæ bearings are satisfactory, but they were fitting rather too closely. This was corrected.

All the exterior parts were cleaned and freshly lubricated with sperm.

According to my instructions I endeavoured to correct the error in the marking of the velocity pencil, but it is not an easy thing to do, and I had a good deal of trouble with it.

It was adjusted several times, and the traces finally obtained by revolving the spiral in various positions on the cylinder throughout the 24-hours' scale are more satisfactory and fairly regular with the zero line, and I am in hopes that it will mark better now, and keep so more permanently. In taking down the frame, the screw nut holding the bevel-wheel to the upright plate broke off (possibly flawed), but I fitted a thinner washer and another turn to the thread, and the nut should now hold securely.

It was necessary to dismount this, as some oil running down the coupling rod had "caked" on the bearings, and the wheel ran stiffly.

The clock was cleaned and oiled, and the orientation tested.

Glasgow, August 16th–18th.—The meteorological instruments at this observatory were all working satisfactorily.

The anemometer was dismounted on August 16th, and thoroughly cleaned and lubricated.

The oil was good, it was replaced with fresh sperm.

The clock and pencils were cleaned, and all left in good order. The orientation was satisfactory.

The clocks of both barograph and thermograph required cleaning, which was done, and a new driving line was fitted to the barograph.

The dry and wet bulb lights were equalized, and shields were fitted to block out the stray light.

The clock of the Beckley rain-gauge was cleaned, and "squeezes" taken of both gauges.

Oxford (*Radcliffe Observatory*), October 20th–21st.—The self-recording meteorological instruments at this observatory were as usual in a satisfactory condition.

I dismounted the anemometer, as it was not taken down in 1898. The asbestos lubricant which had been in use for 2 years was still fluid, but rather dirty, and had caked a little on the direction roller bearings. All parts were thoroughly cleaned, fresh oil added, and the instrument left in good order.

The orientation was satisfactory, and the sheet is sent with this report.

There was nothing calling for remark in the barograph and thermograph; they have been cleaned, and the photographic curves are very good.

No "second" curves are obtained here.

The rain-gauge was examined and found to be working satisfactorily, but a supply of ink and a "Richard" pen were required, and these have been since supplied.

Telegraphic Reporting and Climatological Stations.

Yarmouth, July 29th.—The instruments generally were in good order, but the "Richard" barograph was reading about 0·35 inch too high. It was not possible to correct this by means of the set-screw, as the threads of the latter are worn, and it does not hold, so I had the slot in the aluminium index-arm drilled out, so that it could take up at a slightly different angle, and by carefully readjusting this the error has been reduced to practically nothing.

I went into the question of its indication with Mr. Watson, explaining what was required, and think its records should prove more useful in the future.

North Shields, August 2nd.—The thermometers and barometers at this station were in good order, and Mr. Clarke appears to take pleasure in the observations.

The new rain-gauge, M.O. 414, is in good order.

Alnwick Castle, August 4th.—The present observer has been in charge since February, and seems to take interest in the observations.

I gave him instructions on various points, especially with respect to the management of the wet bulb, and the maximum and minimum thermometers.

The instruments were in good order, with the exception of the wet bulb, but it was promised that the muslin and capillary threads should be changed more frequently.

The 5-inch bottle rain-gauge is a very poor and old instrument, and is perishing at the junction of rim and cylinder.

Corrections for Thermometers.

Stations.	Temperature of water.	Dry Bulb Stand.	Wet Bulb Stand.	Maximum.	Minimum.	Additional thermometers.	
						Description.	Correction.
	°						
Oxford (Radcliffe).	45	Thermograph Screen.				Grass minimum	+0·4
		−0·2	−0·2	..	..	Attached to barometer (above 32°).	−0·8
		Stevenson Screen.					
		−0·4	−0·3	−0·4	+0·1	Attached to barometer (below 32°).	−0·4
Yarmouth ..	62	−0·1	−0·2	−0·4	+0·6	Spare tube	−0·6
North Shields ..	60	−0·1	−0·3	−0·3	+0·6	„ „	0·0
Alnwick Castle ..	62	−0·2	−0·3	−0·2	+0·3		
Glasgow	59	−0·1	0·0	0·0	0·0	Grass minimum	+0·2
Aberdeen ..	61	−0·1	−0·7	+0·1	+0·4	Attached to barometer ..	−0·3

(REPORT OF METEOROLOGI

MAP SHOWING THE HAVE BEEN RECEIVED.

APPENDIX XV.

List of Documents received from Foreign and Colonial Land Stations during the year ending March 31st, 1900.

Place.	Observer.	Nature of Observations.
Antigua	Francis Watts and K. McDonald ...	Observations twice daily, 1899, March to December; 1900, January, February.
Bahamas (Abaco)	Lightkeepers...	Lighthouse Register, 1899, January to December.
„ (Cat Cay)	A. S. Haigh	Barometer diagram, 1899, March.
„ (Cay Lobos)	Lightkeeper	Lighthouse Register, 1899, January to December.
„ (Cay Sal)	„	„ „ „ „ „
„ (Inagua)	„	„ „ „ „ „
„ (Nassau)	J. A. Karr	Observations once daily. 1899. March to December; 1900, January.
„ (Watling Island) ...	Lightkeeper	Lighthouse ... ember.
Barbados	J. R. Bovell	Monthly s... ice daily, 1899, February to December
Beyrout (Lee Observatory) ...	R. H. West, M.A., & R. S. Dugan...	Observation ... to December; 1900, January, February.
Cape Pembroke (Falkland Islands)	G. K. Broom, Lightkeeper	Lighthouse Register, 1899, January to December.
Cape Spartel (Tangier)	J. J. Emmott and E. C. Hathaway, Lloyd's Signalmen.	Observations twice daily, 1899, March to December; 1900, January, February.
Colon, Isthmus of Panama ...	Rev. S. P. Hendrick	Observations twice daily, 1899, March to June.
Cyprus (Famagusta)	G. Eliades	Observations twice daily, 1899, January to December.
„ (Kyrenia)	P. Michaelides	„ „ „ „ „ „
„ (Larnaca)	V. Feneck	„ „ „ „ „ „
„ (Limassol)	Luigi Béraud	„ „ „ „ „ „
„ (Nicosia)	P. Nicopoulos	„ „ „ „ „ „
„ (Papho)	E. A. Malliotis and M. Theodorides	„ „ „ „ „ „
Fort Johnston (B.C.A.)	F. S. S. Wright	Monthly Summary of Observations, July, 1896, to February, 1899.

LIST OF DOCUMENTS received from FOREIGN AND COLONIAL LAND STATIONS during the year ending March 31st, 1900. —*continued.*

Place.	Observer.	Nature of Observations.
George Town (British Guiana)...	Robert Ward...	Observations twice daily, 1899, February to December; 1900, January, February.
" " " " ...	" "	Daily record of sunshine, 1899, February to December; 1900, January, February.
Gibraltar	Sergeant J. Power, Med. Staff Corps.	Observations twice daily, 1899, March to December; 1900, January, February.
Gold Coast (Aburi)	Assistant Colonial Surgeons ...	Observations twice daily, 1899, February to December.
" " (Accra)	" " " ...	" " " " " "
" " (Adda)	" " " ...	" " " " " "
" " (Axim)	" " " ...	" " " " " "
" " (Cape Coast Castle)	" " " ...	" " " " " "
" " (Gambaga)	" " " ...	" " " " January to September.
" " (Kubi Kur)	W. L. Bennett	" of rainfall, July, 1895, to June, 1899.
" " (Kumasi)	Assistant Colonial Surgeons ...	" twice daily, 1899, January to December.
" " (Kwitta)	" " " ...	" " " " February "
Kambole (Tanganyika)	J. G. Mackay	Observations of rainfall and temperature, 1898, October to December; 1899, January, February.
Lagos	T. B. Wright...	Observations twice daily, 1899, February to December; 1900, January.
Malden Island	... ...	" " " 1897, May to December; 1898, June to December; 1899, January to June.
Reefton (New Zealand) ...	... ...	Observations of temperature and cloud, October, 1898, to February, 1899.

St. Helena	A. L. C. Hands	Observations once daily, 1899, January to December.
„	„	Continuous record of wind (direction and velocity), 1899, January to December.
„ (James Town) ...	A. E. Broadway	Daily rainfall, 1899, February to December.
„ (Mount Pleasant) ...	T. C. Barker	„ „ „ January to March, May to November.
Sierra Leone	Z. Grant	Observations twice daily, 1899, March to December; 1900, January, February.
Sombrero	J. A. Richardson and A. L. Richardson.	Lighthouse Register, 1898, October to December; 1899, January to September.
Teneriffe	A. Samler Brown	Notes on dust storm of February 15 to 19, 1898.
„ (Sitio de Cullen) ...	A. F. Perry	Observations twice daily, 1899, February to December (except August).
„ „ „ ...	„	Continuous record of pressure, 1899–1900.
„ „ „ ...	„	„ „ temperature, 1899–1900.
Trinidad	J. H. Hart	Observations twice daily, 1898, January to December; 1899, January to November.

APPENDIX XVI.

ANEMOMETER EXPERIMENTS AT HOLYHEAD.

REPORT BY MR. R. H. CURTIS.

In the reports of the office for the years 1896 and 1898 some account was given of comparisons which had been made of the records of four different anemometers erected by the Council at Holyhead.

One point of considerable importance which these comparisons had made clear was the necessity for erecting anemometers in positions where their exposure to the wind should be perfectly free from the influence of any local obstacles capable of breaking up the currents of air. It was shown that the records of the Robinson cup anemometer which had been erected upon the old lighthouse at the entrance to the Inner Harbour—a position which had hitherto been regarded as exceptionally good—were influenced in a peculiar manner by the adjoining railway sheds, and, therefore, when shortly afterwards this anemometer had to be dismounted for repair, it was decided not to re-erect it in its old position, but to place it on Salt Island, close to the pressure anemometers which were already there.

Accordingly in 1899 a suitable stand of open ironwork was erected to receive it, and at the end of November the anemometer was restarted in its new position, which is within a few yards of the pressure anemometers, at the end of the island. As yet there has not been time to collect a sufficient number of observations for the purpose of making a comparison of its records in its new position with those of the other anemometers, but this work will probably be commenced in the course of the ensuing year.

Meanwhile the comparison of the records of the pressure-plate anemometer,* with the corresponding maxima recorded by the pressure-tube anemometer erected close beside it, has been continued.

The pressure-plate anemometer was designed with a view to preventing the plate from oscillating to and fro with the variations of wind force, and of thus reducing the effect due to momentum, which it was thought was probably the cause of the very high readings which have from time to time been registered by freely oscillating plates. It is only the maximum force reached since the last observation which is recorded by the plate, and this accounts for the comparatively small number of observations which is available even now after the lapse of two years, and naturally the deficiency is most marked in the case of the more rarely occurring high pressures.

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* The construction of this instrument is described in the Report for 1897–98, page 25.

E.Weller & Grahams. Ltd Litho. London.

The method employed in making the comparison was to compare the maximum pressure registered by the plate with the maximum recorded during the same interval of time by the pressure-tube anemometer. These tube equivalents were then grouped and meaned, and the results are shown in the following Table, which gives the mean equivalent pressure by the tube for each pound recorded by the plate. The results are also given graphically in the accompanying diagram.

Comparison of Pressure-Plate and Pressure-Tube Anemometers at Holyhead.

Equivalent Mean Pressure per square foot by the Tube instrument for increments of one pound in the pressure recorded by the Plate.

Mean Pressure by Plate.	Mean Corresponding Pressure by Pressure Tube.	No. of Observations.
Pounds per Square Foot.		
½	1·4	295
1½	2·8	97
2½	3·8	77
3½	4·9	61
4½	6·1	44
5½	6·9	42
6½	7·8	29
7½	8·8	18
8½	10·3	18
9½	11·1	17
10½	11·5	8
11½	13·5	2
12½	13·2	3
13½	No observation.	—
14½	15·4	
15½	18·3	
16½	No observation.	—
17½	16·4	1
18½	18·3	3
19½	No observation.	—
20½	20·2	2

In constructing the pressure plate no attempt was made to counterpoise the weight of the chain by which the plate is connected with the spring, and therefore this weight, together with the friction of the moving parts, has to be considered as an

addition to the indication of pressure yielded by the scale of the instrument, and will to some extent account for the excess of about one and a half pounds which the tube anemometer generally registers as compared with the plate. With very strong winds, however, it will be noticed that this difference decreases, and for the highest forces hitherto registered the two instruments yield practically the same pressure.

The observations in gales are as yet too few to enable one to predict the further course of the curve on the diagram. Too much weight must not be given to isolated observations, especially for two reasons which it is well to bear in mind. The first of these is the tendency for the maxima recorded by the tube anemometer in gusts of very brief duration to be too low, owing to the time not being sufficient to allow the float to fill before the actual maximum of wind force has passed. The effect of this would be to pull down the curve at high pressures, since the fault would probably not be very marked except with the strongest gusts. The second consideration is suggested by some of the observations, namely, that occasionally the distribution of a gust is such that the few feet of distance which separates the plate from the vane of the pressure tube is sufficient to prevent both instruments from being equally affected. Such a fault would not, however, be peculiar to either instrument, and its effect might be expected to disappear from the mean of a few observations.

The reports of the Bidston Observatory of the Mersey Docks and Harbour Board for the years 1897 and 1898 contained tables showing the maximum wind force recorded daily at that observatory by a pressure-tube anemometer precisely similar to the one in use at Holyhead, and by an Osler pressure-plate anemometer of the usual construction, in which the movement of the plate is not restrained as it is in the Holyhead instrument.

These tables give, therefore, the data for making a similar comparison to that already described, but for an oscillating instead of a non-oscillating plate, and it is interesting to compare the results for the two instruments.

The wind pressures as measured by the tube anemometers were pretty much the same at both Holyhead and Bidston, the actual maximum in the two years occurring at the latter place, but only exceeding the corresponding record at Holyhead by about two pounds per square foot.

On the other hand the corresponding pressures indicated by the two plates, for winds of the same force as measured by the tubes, differed very widely, and whereas the actual maximum pressure by the plate at Holyhead was only between 20 and 21 pounds per square foot, which agreed very closely with the record of the tube anemometer, the plate at Bidston recorded a pressure of 63 pounds when 22½ pounds was registered by the tube; and records amounting to between 30 and 50 pounds per square foot occurred on ten other occasions upon neither of which did the tube records exceed 17 pounds per square foot. In the year 1871 the plate at Bidston registered the remarkable pressure of 90 pounds per square foot.

The approximate identity of the extreme readings of the pressure-tube records at the two stations may be taken to indicate that the large differences in the extreme pressures shown by the two-plate instruments are to be attributed to differences in the construction of the instruments and not entirely to differences in the force of the wind at the two stations.

The conditions under which the scale of the Bidston plate was graduated are not in fact similar to those which exist in a gale of wind. In the former case the pressure was steadily and continuously augmented, whilst in the latter it is applied intermittently; and where the plate is able to oscillate under intermittent impulses an excessive record is always possible.

In the case of the Holyhead plate the chance of error from this cause is reduced, because the plate was so constructed that it could not return after having been once moved by the wind, subsequent movement being possible only with yet stronger gusts of wind, a condition which approximates more closely to that under which the scale is graduated.

The results of the Bidston comparison are shown graphically in the lower curve upon the diagram, so that the results of the two comparisons may be examined together.

R. H. CURTIS.

APPENDIX XVII.

I.

Researches on Atmospheric Electricity.

[*Letter from the Chairman of the Meteorological Council to the Secretary of the Royal Society.*]

Meteorological Office, January 24, 1900.

Sir,

1. In my letter of 27th June, 1899, I intimated that the Meteorological Council proposed "to apply to the Royal Society in January next [1900] for a further grant to enable them to retain the services of Mr. C. T. R. Wilson till the end of the second year, from October, 1898," and at the same time conveyed the application of the Council for a grant of £100 from the reserved funds in the hands of the Royal Society, to cover the period between October, 1899, and April, 1900, and thereby to provide for the continuance of Mr. Wilson's researches until the intended application for a grant in 1900 could be considered in due course.

2. The grant of £100 from the reserved funds was made, and I am now requested by the Meteorological Council to forward to you, for consideration by the Government Grant Committee, their application for £100 to complete the sum necessary to secure Mr. Wilson's services for the remainder of the two years at £200 per annum.

3. I enclose a further report by Mr. Wilson (in continuation of the paper read before the Royal Society on the 15th June last, and published in the Philosophical Transactions, Vol. CXCIII., A.) upon the work in which he is engaged. The reference numbers therein are those of a preliminary programme submitted by Mr. Wilson and adopted by the Council. I enclose herewith a copy of this programme for the purposes of reference.

4. Upon Mr. Wilson's report I beg leave to remark that that part of the work proposed, which concerns the more immediate purposes of Meteorology (headings I., II., III.), cannot, probably, be carried out within the time assigned, because (1), as regards the comparison of the results of self-recording instruments at Greenwich and Kew, a preliminary inquiry has shown that the records are not properly comparable as they stand, and (2), as regards the further investigation of the electrical state of the atmosphere at different heights, Mr. Wilson has not found the mode of experimenting suggested by him in his preliminary programme to be sufficiently promising, and he is now clearly of opinion that, for a satisfactory investigation, ascents in free balloons must be employed.

5. The Council will not omit to take advantage of any opportunity that may arise of obviating these difficulties and providing the facilities required for the prosecution of these lines of research, but under existing circumstances they cannot hope to put Mr. Wilson in a position to make a satisfactory report on this side of the work within the time available.

6. But the facts referred to by Mr. Wilson as having been incidentally observed in connection with his free-air observations upon the behaviour of various "collectors" are of such interest and importance that their investigation ought certainly to be followed up. They will probably lead to a considerable increase in our knowledge of the use of instruments employed for the study of atmospheric electricity.

7. Of the original programme there remains the experimental work upon the connection between precipitation and electrification. It is in this department that important results have already been obtained and recorded in the Philosophical Transactions. Mr. Wilson is still engaged upon experiments in the same direction, and in the opinion of the Council it is most desirable that he should be enabled to continue them.

8. In the paper before referred to (Philosophical Transactions, Vol. 193, p. 307), Mr. Wilson briefly touches upon the bearings of his researches upon the phenomena of precipitation in the free atmosphere, but he has not yet fully developed this section of the work. He would, no doubt, be in a more secure position for this purpose if he could have the opportunity of making the balloon observations which he desires to make, but even if such opportunities are not available, his contribution in this department would be of substantial value to the Physics of Meteorology.

9. The results which, in the opinion of the Council, may be expected from the continuance of Mr. Wilson's researches to the end of the two years originally contemplated, by means of the grant now applied for, are those enumerated in paragraphs 6, 7, 8. The Council have every reason to believe that the retention of Mr. Wilson's services in experimental work will be of great advantage in the extension of our knowledge of the physical bases of Meteorology, a department of physics which lies somewhat outside the ordinary lines of physical research, and for which so competent an experimenter as Mr. Wilson is very rarely available.

I have the honour to be, &c.,
R. STRACHEY,
Chairman, Meteorological Council.

NOTE.—The grants already made upon the application of the Meteorological Council in connection with this subject are :—

	£
May 28th, 1898	200
November 7th, 1899	100

The grant now applied for is £100.

Prof. A. W. Rücker, F.R.S.,
Secretary Royal Society.

II.

Mr. Wilson's Preliminary Programme of Work to be done on Atmospheric Electricity.

I. Further comparison of Greenwich and Kew records :—

On certain days the similarity of the electrograph curves from the two places is very marked, even in the rapid fluctuations. The same disturbing influence has plainly in certain cases affected both places. Not only do instantaneous reversals of potential, such as might be explained by lightning flashes in the neighbourhood, take place simultaneously at the two places, but other plainly marked, rapid but not instantaneous changes appear on both curves in such a way as to suggest that the same electrified mass has passed over the two places in succession. I propose to examine such cases more closely and to obtain particulars as to the weather on such days, and especially as to the direction and velocity of the wind. Mr. Chree has kindly offered to furnish me with such information on these points as I may require.

II. Simultaneous observations of the potential gradient near the earth's surface and at such heights as it may be found possible to examine with the aid of fuses carried up by small captive balloons.

The object of these experiments would be to determine whether the air as a whole in the layers of the atmosphere accessible in this way possesses a volume electrification, positive or negative, or is uncharged; this being important in connection with questions as to the origin of atmospheric electricity (*i.e.*, whether the electrification is produced by processes taking place at the surface of the earth or in the upper regions of the atmosphere).

The measurements would, I consider, most conveniently be made by means of two Exner's electroscopes. These have the small capacity necessary for this method, and are portable and sufficiently accurate for the purpose. This is the apparatus used by Elster and Geitel, as well as by Exner himself, in measurements in atmospheric electricity. I believe the cost of the instrument is about £1 only.

Later it would be desirable to try similar experiments with a pair of recording electrometers. By this means it should be possible to decide definitely whether the rapid fluctuations of potential near the earth's surface are due to the motion of electrified masses of air at a comparatively small elevation, for any electrified body passing below the upper pair of fuses and above the lower would affect the two electrometers in the opposite sense.

To begin with I propose to make these open-air observations in a field belonging to the observatory here, of which Sir Robert Ball has kindly offered me the use.

III. I propose to leave till later the work suggested in this section of the memorandum of June 22.

IV. and V. Laboratory experiments, with the object of throwing light on the probable nature of the carriers of the electricity in the atmosphere and on the most likely sources of atmospheric electricity.

I propose beginning with experiments to determine whether electrification is likely to be produced by the precipitation of vapour from the supersaturated state in the form of rain. Certain of my recent experiments, as Professor Thomson has pointed out to me, show that such an effect is quite a likely one.

C. T R. WILSON.

Cambridge,
October 19, 1898.

MR. WILSON'S FURTHER REPORT ON INVESTIGATIONS IN ATMOSPHERIC ELECTRICITY.

I. *Comparison of Electrograph Curves of Kew and Greenwich.*—A preliminary comparison of some of the curves from the two places seemed to indicate differences due to the methods of measuring potential not being the same. I have inspected the apparatus at work at both places. As is shown by the published accounts of the observations, there is a difference in the methods of using the electrometer at Greenwich and at Kew, the method in use at the latter place being that which is adopted in most observatories where a self-recording electrometer is at work. This, as well as other differences in the details of the methods, and the absence of any knowledge of the scale values of the instrument at Greenwich, make any very exact comparison of the curves from the two places hardly possible at present.

I am continuing the study of the Kew electrograph curves in connection with that of other meteorological records.

II. *Potential gradient at different heights above the earth's surface.*—In connection with this part of the work only preliminary experiments on the methods to be employed have been carried out. The first part of the problem was to find a satisfactory method of getting absolute measurements of the potential gradient near the ground. This was, I think, accomplished. Attempts were now made, by means of a small captive balloon, to get measurements of the gradient at an elevation, but the method did not seem promising. At present, I do not see how to solve the problem of getting trustworthy measurements of the potential gradient at any considerable elevation, so long as the observer remains at the surface of the earth. Although interesting qualitative results may perhaps be obtained under such conditions, they must, I think, remain very difficult to interpret, and in particular they are unlikely to enable us to solve the problem of finding how the potential gradient varies with the height, or in other words of testing the nature of the distribution of the volume electrification of the air. Such observations of atmospheric electricity with the aid of kites are

now, I believe, being carried on in America. Observations from the car of a captive balloon are dangerous on account of the risk of ignition of the gas by sparks, if any attempt be made to bring to the potential of the air in the neighbourhood any apparatus in the car of the balloon, while this is connected with the earth by the cable. The interpretation of the results would, moreover, be very difficult, and the same difficulty is attached to observations on high towers or on mountain summits. Information may however be obtained from such observations as to the relative extent to which diurnal or other variations of potential occur at different heights; the Eiffel Tower observations have given interesting information of this kind. An observer in a free balloon appears to be much more favourably situated for obtaining reliable measurements of potential gradient in the free air, and recent observations of several continental observers agree in showing a diminution in the potential gradient with increasing height. Further observations of the same kind are desirable. With a view to enabling such balloon observations to be more easily carried out, I have made experiments to see whether substitutes for the water-dropper or electrometer match, both of which are inconvenient in balloon work, could be found. Experiments to test the efficiency, as a collector of atmospheric electricity, of a short piece of thin platinum wire, rendered incandescent by the current from a small secondary cell, gave very promising results. Such a collector was found to compare very favourably (apart from its convenience) with the ordinary electrometer match; incidentally it was noticed that the latter, besides being much slower than the hot wire, had the serious defect of allowing positive electricity to escape many times more slowly than negative. This tends to cause the frequency of occurrence and the magnitude of negative values of potential to be underestimated, especially in cases of rapid alternation between positive and negative values. I have tried also as collectors some of the recently discovered "radio-active" substances, and am of opinion that they may be of use in balloon work.

III. *Travel of Electrical Potential changes.*—Nothing has yet been attempted in this branch of the subject.

IV. *Laboratory experiments to throw light on the connection between Precipitation and Atmospheric Electricity.*—I have, following a suggestion of Prof. J. J. Thomson, carried out a series of experiments to test whether the positively and negatively charged particles or "ions," which are present in air whenever this is capable of conducting electricity, differ in their power of acting as nuclei for the condensation of water vapour. The results of this investigation have been published in a paper, "On the Comparative Efficiency as Condensation Nuclei of Positively and Negatively charged Ions" (Phil. Trans. A. Vol. 193, pp. 289—308, 1899). These experiments prove that water condenses much more readily on negatively than on positively charged ions. We should thus expect a preponderance of negatively charged rain, positively charged ions being left behind in the atmosphere. We have in this a possible explanation of the normal excess of positive electricity in the atmosphere.

Experiments are being carried out with a view to making possible a more direct examination of the electrical effects of rainlike condensation, and also of the sudden freezing of drops.

It would be desirable to test directly, as Elster and Geitel have attempted to do, whether actual raindrops are charged with electricity, and if they are, to find the nature of the charge which they carry. It is unfortunately a matter of great difficulty to devise a trustworthy method of accomplishing this.

It is evident that before the question of the connection between atmospheric electricity and precipitation can be solved, it is necessary to know more than we do about the nature of the latter process; to know, for example, from what height the rain generally falls, from the lower clouds or from the air above them; and whether it seldom or frequently has its origin by condensation from the supersaturated condition. These and other questions could probably be solved by balloon ascents.

C. T. R. WILSON.

Cambridge,
January 16th, 1900.

APPENDIX XVIII.

ADDITIONS TO THE LIBRARY DURING THE YEAR ENDING 31ST MARCH, 1900.

Aachen, Meteorologische Station.—Deutsches meteorologisches Jahrbuch für 1898. Meteorologische Station I. Ordnung in Aachen. Ergebnisse der meteorologischen Beobachtungen. Herausgegeben . . . von P. Polis. Jahrg. 4. la. 4°. Karlsruhe, 1899.

——— ——— Ergebnisse der 1899 in Aachen von der meteorologischen Station Aachen des Königl. Preuss. Meteorologischen Instituts angestellten Beobachtungen. sm. f°. Sheet

——— ——— **Centralstation.**—Uebersicht der Witterung. March, 1898–Dec. 1899. Slips.

Abbe, C.—The altitude of the aurora above the earth's surface. 8°. (*Proc. Amer. Phil. Soc.*, 37, 1898, *p.* 4.)

Adelaide Observatory.—Meteorological observations made at the Adelaide Observatory, and other places in South Australia and the northern territory, during the year 1896, under the direction of C. Todd. sm. f°. Adelaide, 1899.

Aitken, James.—Meteorological table for the year 1898. Compiled from observations taken at Braemar, Aberdeenshire. oblong sm. f°. Sheets.

‖ **Albert, Ier., Prince de Monaco.**—Exploration océanographique aux régions polaires. la. 8°. Paris, 1899. (*Bull. Muséum Hist. Nat.*, 1899, *p.* 6.)

——— ——— Première campagne de la Princesse Alice II°. 4°. (*Compt. rend. acad. sc., Paris*, 128, 1899.)

[Algiers, Service Météorologique du Gouvernement Général de l'Algérie.]—Bulletin météorologique de l'Algérie. 1899, Jan. 1–Dec. 31. sm. f°. Sheets.

Algué, J.—Las nubes en el Archipiélago Filipino.

See MANILA, OBSERVATORIO.

[Allahabad, Meteorological Office.]—Administration report of the Meteorological Reporter to Government, North-Western Provinces and Oudh, for the year 1898–99. sm. f°. Allahabad, 1899.

——— ——— Brief sketch of the meteorology of the North-western Provinces and Oudh, and adjacent parts of Rajputana and the Panjab, for the year 1898. sm. f°. Allahabad, 1899.

Amsterdam, Kon. Nederlandsch Aardrijkskundig Genootschap.—Tijdschrift. Tweede serie. Deel 16. 8°. Leiden, 1899.

Athens, Observatoire National.—Annales . . . publiées par D. Eginitis. Tome 1. la. 4°. Athènes, 1898.

Azambuja, G. A. de.—Annuario do Estado do Rio Grande do Sul. 1900. Anno 16. sm. 8°. Porto Alegre, 1899.

* **Bacon, J. M.**—Climate and the atmosphere. la. 8°. (*Nineteenth Century*, 1900, *Jan.*, *p.* 94.)

* ——— The war of winds: a commentary on weather forecasts. la. 8° (*Nat. Rev.*, 1900, *Jan.*, *p.* 727.)

NOTE.—Books marked * have been acquired by purchase; the others are donations from institutions, societies, or authors. Those marked ‖ are excerpt papers, extra copies of which have been separately printed.

In some cases additional publications have been received besides those specified, but only completed volumes or years are given here.

Baltimore, Maryland Weather Service.—Maryland Weather Service. Vol. 1. la. 8°. Baltimore, 1899.

[Bangalore, Mysore Government Meteorological Department.]—Meteorology in Mysore, for 1898, being the results of observations at Bangalore, Mysore, Hassan and Chitaldrug. By John Cook. la. 4°. Bangalore, 1899.

——— ——— Report on rainfall registration in Mysore, for 1898. By John Cook. la. 4°. Bangalore, 1899.

* **Bartholomew, J. G., Herbertson, A. J. and Buchan, A.**—Atlas of meteorology. Bartholomew's Physical Atlas. Vol. 3. f°. Westminster, 1899.

Batavia, Magnetical and Meteorological Observatory.—Observations. Vol. 20, 1897. f°. Batavia, 1898.

[Batavia, Observatorium.]—Regenwaarnemingen in Nederlandsch Indië. 19. Jaarg, 1897. 8° Batavia, 1898.
Title and Preface in the English language also.

Bath, Medical Officer of Health.—Annual report to the Bath Urban Sanitary Authority, by the Medical Officer of Health. 33rd, 1898. 8°. Bath, 1899.

‖ **Bauer, L. A.**—The physical decomposition of the earth's permanent magnetic field. No. 1. The assumed normal magnetization and the characteristics of the resulting residual field. la. 8°. (*Terrestr. Magnetism*, 4, 1899, *p.* 33.)

‖ ——— Is the principal source of the secular variation of the earth's magnetism within or without the earth's crust? la. 8°. (*Terrestr. Magnetism*, 4, 1899, *p.* 53.)

‖ **Baxendell, J.**—A new self-recording anemoscope. la. 8° (*Quart. Journ. R. Meteor. Soc.*, 25, 1899, *p.* 326.)

‖ **Bayard, F. C.**—The Government meteorological organizations in various parts of the world. la. 8°. (*Quart. Journ. R. Meteor. Soc.*, 25, 1899, *p.* 69.)

Belize, Public Hospital.—Meteorological observations, 1898, Jan.–Dec. sm. f°. Sheets.

Belize, St. Joseph's Observatory.—Summary of meteorological observations, 1899, Jan.–Dec. 4°. Sheets. (*The Angelus, Belize*, 1899–1900.)

B[entley], R.—Brief chronological index to some physical phenomena which have occurred in this neighbourhood (Upton, Bucks). 8°. s.l., 1897.

——— A quarter of a century's rainfall at Upton, 1874–1899. 8°. s.l.e.a.

Bergholz, P.—Die Orkane des Fernen Ostens. la. 8°. Bremen und Schanghai, 1900.

——— Die Taifune in den ostasiatischen Gewässern, Nach Doberck: The laws of storms (Hong Kong, 1898.) sm. f°. (*Meteor, Zeitschr.*, 1898, *Sept.*, *p.* 332.)

Berlin, Königlich Preussisches Meteorologisches Institut.—Bericht über die Internationale Meteorologische Conferenz zu Paris, 1896.

See PARIS.

——— ——— Bericht über die Thätigkeit . . . im Jahre 1898, von W. von Bezold. la. 8°. Berlin, 1899.

——— ——— Ergebnisse der meteorologischen Beobachtungen in Potsdam, 1897. la. 4°. Berlin, 1899.

——— ——— Ergebnisse der Niederschlags-Beobachtungen in den Jahren 1895 und 1896. la. 4°. Berlin, 1899.

‖ ——— ——— Witterung nach den Beobachtungen des königlichen meteorologischen Instituts. 1899, Jan.–Dec. la. 4°. (*Statist. Korresp.*)

Bermuda, Registrar General's Office.—Report of the Registrar General for the year 1898. sm. f°. [illegible]

Berne, Eidgenössisches Oberbauinspectorat, Hydrometrisches Bureau.—Graphische Darstellung der schweizerischen hydrometrischen Beobachtungen sowie der Lufttemperaturen und Niederschlagshöhen für das Jahr 1898. la. f°. Sheets.

In the French language also.

——— ——— ——— Wasserverhältnisse der Schweiz. Rhonegebiet von den Quellen bis zum Genfer—See. f°. Berne, 1898.

Birmingham, Observatory of the Birmingham and Midland Institute.—Records of meteorological observations taken at the Observatory of the Birmingham and Midland Institute. By A. Cresswell. 1899. 8°. (*Proc. Birmingham and Midland Inst. Sc. Soc.*)

‖ **Boffito, G.**—Un poeta della meteorologia. Giovana Pontano. la. 8°. Napoli, 1899. (*Atti. Accad. Pontaniana*, 29.)

Bolton.—Annual report of the Museums and Meteorological Observatory for 1899. 8°. Bolton, 1900.

Bombay, Government Observatory.—Magnetical and meteorological observations made at the Government Observatory, Bombay, 1897. f°. Bombay, 1898.

(——— ———) Report on the condition and proceedings of the Government Observatory, Colába, for the year which ended with the 31st March, 1899. f°. s.l.e.a.

[**Bombay, Meteorological Office.**]—Brief sketch of the meteorology of the Bombay Presidency for 1898–99. f°. s.l.e.a.

Börnstein, R.—Eine Beziehung zwischen Luftdruckverteilung und Monddeklination. 4°. (*Phys. Zeitschr., Göttingen.* 1. *Jahrg.*, 1899, *No.* 4.)

* **Bouttieaux Capitaine.**—La météorologie appliquée à l' aérostation. 8° Paris, s.a.

* **Brebner, C. W.**—New handbook for the Indian Ocean, Arabian Sea, and Bay of Bengal, with miscellaneous subjects for sail and steam. Mauritius cyclones and currents, moon observations, and sail-making. la. 8°. Bombay, 1898.

Bremen, Meteorologisches Station I. Ordnung.—Deutsches meteorologisches Jahrbuch. Ergebnisse der meteorologische Beobachtungen. Herausgegeben von P. Bergholz. Jahrg. 9, 1898. la. 4°. Bremen, 1899.

Briggs, L. J.—The mechanics of soil moisture.

See WASHINGTON, DEPARTMENT OF AGRICULTURE.

‖ **Bristol.**—The International Conference on terrestrial magnetism and atmospheric electricity, held at Bristol in 1898. Proceedings, papers, and report of Permanent Committee. la. 8°. Cincinnati, 1898. (*Terrestr. Magnetism*, 1898, 3, *p.* 93 ; 4, *p.* 139.)

‖ **Brodie, F. J.**—The prolonged deficiency of rain in 1897 and 1898. la. 8°. (*Quart. Journ. R. Meteor. Soc.*, 25, 1899, *p.* 181.)

Brussels, Observatoire Royal.—Bulletin quotidien. 1899, Jan. 1–Dec. 31. f°. Sheets.

‖ ——— **Observatoire Royal de Belgique à Uccle.**—Résumé des observations météorologiques faites à l' Observatoire Royal de Belgique, à Uccle, pendant l'année 1898. sm. 8°. Bruxelles, 1899. (*Ann. Observ. R. de Belgique*, 1899.)

‖ **Buchanan J. Y.**—The meteorology of Ben Nevis in clear and in foggy weather. la. 4°. Edinburgh, 1899. (*Trans. R. Soc. Edinb.*, 39, *Part* 3.)

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Budapest, Magyar Kir. Országos Meteor. Intézet.—Meteorologiai feljegyzesek. 1899. Jan.–Dec. and year. Oblong la. 8°. Sheets.

* **Bull, H. J.**—The cruise of the "Antarctic" to the south polar regions. 8°. London and New York, 1896.

Cairo, Ministère de l'Intérieur. Administration des Services Sanitaires et d'Hygiène Publique.—Bulletin hebdomadaire. 14me année, 1899 Nos. 1–52. Suppl. au Journ. Officiel, 1899–1900. la. 4°.

Calcutta, Meteorological Office, Bengal.—Administration report of the Meteorological Reporter to the Government of Bengal for the year 1896–99. f°. s.l.e.a.

——— ——— ——— Bay of Bengal and Bengal daily weather report. 1899. sm. f°. Sheets.

These reports are only published during the rainy season.

[——— ——— ———] Bay of Bengal weather chart. 1899. sm. f°. Sheets.

From May to October this is combined with the "Bay of Bengal and Bengal daily weather report."

(——— ——— ———) Meteorological and rainfall table of the Province of Bengal for the months of January to December, 1899, with annual tables. sm. f°. Sheets.

——— ——— ——— Meteorological summary for the monsoon period of 1899. sm. f°. s.l.e.a.

[——— ——— ———] Summary of the meteorology of Bengal for the year 1898. sm. f°. s.l.e.a.

——— ——— **India.** Abstract of the results of meteorological observations taken at the Alipore Observatory in the months of Jan.–Dec. 1899. sm. f°. Sheets.

——— ——— ——— Forecast of the cold weather rains in Northern and Central India, December 1899 to February 1900. sm. f°. (Simla, 1899.)

——— ——— ——— India daily weather report. 1899. Jan. 1–Dec. 31. 2 vols., f°. Simla, 1899–1900.

——— ——— ——— Indian meteorological memoirs. Vols. 7–10. 4 vols. sm. f°. Calcutta, 1894–99.

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——— ——— ——— Rainfall of India. 7th year, 1897. sm. f°. Calcutta, 1898.

(——— ——— ———) Report on the administration of the Meteorological Department of the Government of India in 1898–99. f°. s.l.e.a.

——— ——— ——— Results of the meteorological observations taken at the Alipore Observatory, from 1st January to 30th December, 1899. sm. f°. Sheets.

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[——— **Surveyor General of India.**]—General report on the operations of the Survey of India Department . . . during 1897–98. sm. f°. Calcutta, 1899.

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——— ——— Niederschlagsbeobachtungen der meteorologischen Stationen im Grossherzogthum Baden. 1899, 1. Halb. la. 4°. Karlsruhe, 1899.

——— ——— Uebersicht der Ergebnisse der an den badischen meteorologischen Stationen angestellten Beobachtungen, nebst Wasserstandsaufzeichnungen an den wichtigsten Hauptpegeln des Rheins. 1899, Jan.-Dez. f°. Sheets.

‖ **Carnera, L.**—Le ore di sole rilevate a Torino mediante l'eliofanometro nel triennio 1896–98. la. 8°. Torino, 1899. (*Atti R. Accad. Sc. Torino*, 34, 1899.)

* ‖ **Carpenter, W. B.**—Further inquiries on oceanic circulation. 8°. London, 1874. (*Proc. R. Geogr. Soc.*, 18, 1874, *No.* 4.)

* ‖ ——— On the temperature of the Atlantic. 8°. (*Proc. R. Inst.*, 7, 1874, *p.* 263.)

* ——— [W. B.]—On the temperature of the deep-sea bottom, and the conditions by which it is determined. 8°. (*Proc. R. Geogr. Soc.*, 21, 1877, *p.* 289.)

‖ **Chandler, A.**—The average of temperature, rainfall, and sunshine of Devon. 8°. (*Trans. Devon. Assoc. Advanc. Sc.*, 31, 1899, *p.* 180.)

Chemnitz, K. Sächsisches Meteorologisches Institut.—Decaden-Monatsberichte. 1898, Jahrg. 1. sm. f°. s.l.e.a.

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* **Ciel et Terre.**—Revue populaire d'astronomie, de météorologie, et de physique du globe. 20e année. 1899–1900. 8°. Bruxelles, s.a.

Claxton, T. F.—On cyclones. A lecture delivered at the Quatre Bornes Club on January 28, 1899. la. 8°. Mauritius, 1899.

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‖ **Colombo, Surveyor General's Office.**—Report on the meteorology of Ceylon for 1898. sm. f°. (*Ceylon Administr. Rep.* 1898, *Part* ii.)

‖ ——— ——— Results of meteorological observations in Ceylon during the months of January to December, 1898. f°. Sheets. (*Suppl. Ceylon Gov. Gazette*. 1898–99.)

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* **Cook, F. A.**—The new Antarctic discoveries. la. 8°. (*Century Mag.*, 59 1900, *Jan.*, *p.* 409.)

Copenhagen, Dansk Meteorologisk Institut.—Bulletin météorologique du Nord, publié par les Instituts météorologiques de Norvége, de Danemark et de Suède. Année 1899. oblong 8°. Copenhague, s.a.

——— ——— Maanedsoversigt over Vejrforholdene. 1899, Jan.–Dec. f°.

——— ——— Meteorologisk Aarbog for 1895, 1896. 2 vols., f°. Kjøbenhavn, 1896–97.

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‖ ——— **und Hamburg, Dänisches meteorologisches Institut und Deutsche Seewarte.**—Tägliche synoptische Wetterkarten für den nordatlantischen Ozean und die anliegenden Theile der Kontinente. 13. Jahrg., 1–4 Quart., Dez. 1893–Nov. 1894. 4 vols. f°. Copenhague et Hambourg, 1898.

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Cordoba, Academia Nacional de Ciencias.—Boletin. Tomo 15. la 8°. Buenos Aires, 1894.

Coventry, Medical Officer of Health.—Annual report on the health of the City, by E. H. Snell. 1898. la. 8°. Coventry, [1899].

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Cracow, K. K. Sternwarte.—Meteorologische Beobachtungen. 1899. la. 8°. Krakau, 1899.

Croydon Microscopical and Natural History Club.—[Daily rainfall at stations in Kent and Surrey], 1899. Jan.–Dec. 4°. Sheets.

‖ ——— ———Report of the Meteorological Sub-committee for 1898. 8°. (*Trans. Croydon Microsc. Nat. Hist. Club*, 1899, *p.* 294.)

Danckelman, A. von.—Klimatologie [Neu-Guinea]. la. 8°. (*Bibliothek der Länderkunde*, 5/6.)

‖ **Davis, W. M.**—The circulation of the atmosphere. la. 8°. (*Quart. Journ. R. Meteor. Soc.*, 25, 1899, *p.* 160.)

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‖ **Devon.**—Report of the Committee on the climate of Devon. Edited by A. Chandler and W. Ingham. 17th, 3rd series, 1898. 8°. (*Trans. Devon. Assoc. Advanc. Sc.*, 31, 1899, *p.* 101.)

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See MANILA, OBSERVATORIO.

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——— **Kais. Königl. Geographische Gesellschaft.**—Mittheilungen 1898, 1899. Bd. 41, 42. 2 vols. la. 8°. Wien, 1898–99.

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——— ——— ——— Bulletin F. W.B. No. 208. Vertical gradients of temperature, humidity and wind direction. A preliminary report on the kite observations of 1898. Prepared . . . by H. C. Frankenfield. la. 4°. Washington, 1899.

——— ——— ——— Bulletin No. 27. W.B. No. 209. The probable state of the sky along the path of total eclipse of the sun, May 28, 1900, observations of 1899. Prepared . . . by F. H. Bigelow. la. 8°. Washington, 1899.

Washington, Department of Agriculture, Weather Bureau.—W.B. No. 213. Meteorological chart of the Great Lakes. Summary for the season of 1899. Vol. II., No. 9. la. 4°. Washington, 1899.

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Discontinued.

——— ——— ——— Monthly weather review. Vols. 26, 27, 1898, 1899. 2 vols. 4°. Washington, 1898–1900.

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For previous dates see ITHACA, NEW YORK STATE WEATHER BUREAU. Report.

——— ——— ——— Report of the Chief of the Weather Bureau. 1897–98. la. 4°. Washington, 1899.

——— ——— ——— Weather map. 1899. Jan. 1–Dec. 31. la. f°. Sheets.

——— **Hydrographic Office.**—Pilot chart of the North Atlantic Ocean. 1899. Jan.–Dec. Charts. la. f°.

——— ——— Pilot chart of the North Pacific. 1899. Jan.–Dec. Charts. la. f°.

——— **Smithsonian Institution.**—Annual report of the Board of Regents . . to July 1897. 8°. Washington, 1898.

Wellington, Meteorological Department.—[Meteorological observations in New Zealand.] 1898. sm. f°. (*Statist. New Zealand*, 1898.)

‖ ——— **Meteorological Office.**—Rainfall. 1899, Jan.–Dec. sm. f°. Sheets. (*New Zealand Gazette.*)

* **Wetter, Das.**—Meteorologische Monatsschrift für Gebildete aller Stände. Herausgegeben von R. Assmann. 16. Jahrg., 1899. la. 8°. Berlin, 1899.

Wild, H.—Ueber die Differenzen der Bodentemperaturen mit und ohne Vegetations— resp. Schneedecke nach den Beobachtungen im Konstantinow'schen Observatorium zu Pawlowsk. la. 4°. St. Pétersbourg, 1897. (*Mém. Acad. Imp. Sc. St. Pétersb.*, 8e *sér.*, *Cl. phys.-math.*, v., No. 8.)

‖ **Wilson, C. T. R.**—On the comparative efficiency as condensation nuclei of positively and negatively charged ions. la. 4°. (*Phil. Trans.*, *series A.*, 193, 1899, *p.* 289.)

‖ ——— On the condensation nuclei produced in gases by the action of Röntgen rays, uranium rays, ultra-violet light, and other agents. Read Nov. 24, 1898. la. 4°. London, 1899. (*Phil. Trans.*, *series A.*, 192, *p.* 403.)

——— **E. M.**—Notes on malaria in connection with meteorological conditions at Sierra Leone. Third year. 8°. London, 1899.

Worthing Observatory.—Weather report. 1899, Jan. to Dec. 4°.

York, Yorkshire Philosophical Society.—Annual report . . . for 1898, 1899. 2 vols. la. 8°. York, 1899–1900.

Zi-ka-wei, Observatoire Magnétique et Météorologique.—Bulletin mensuel. Tome 22, année 1896. sm. f°. Chang-hai, 1899.

Zürich, Schweizerische Meteorologische Central-Anstalt.—Annalen, 1897. "Der Schweiz. meteor. Beob." 34. Jahrg. 4°. Zürich, s.a.

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APPENDIX XIX.

ACCOUNT of RECEIPTS and PAYMENTS for the year ending 31st March, 1900:—

RECEIPTS.	£ s. d.	£ s. d.	PAYMENTS.	£ s. d.	£ s. d.
Balance from year 1898-99	—	2,267 15 7	ADMINISTRATION:		
Parliamentary vote ..	—	15,300 0 0	Council (including portion of Secretary's salary)	937 13 5	
Repayment of expenses charged under—			Secretary .. £795 16 8		
			Less fees for one month as Member of Council .. £12 2 11		
(1.) Incidental expenses	9 12 3			783 13 9	
(2.) Observatories ..	28 11 0		Salaries and wages ..	909 13 6	
(3.) Inspections ..	2 0 0		Rent, fuel, and lighting	731 12 10	
		40 3 3	Incidental and contingent expenses	200 14 1	
SPECIAL RESEARCHES:			Furniture and fittings ..	78 7 11	
Grant for investigation on atmospheric electricity	—	100 0 0	Expenses incidental to International Meteorological Congress ..	3 5 0	
			Pensions	177 6 8	
					3,822 7 2
SUPPLY OF INFORMATION:			SPECIAL RESEARCHES:		
			Salaries and other charges	700 12 10	
Daily Weather Charts and Forecasts . ..	291 3 2		Investigation on Atmospheric Electricity ..	200 0 0	
6 p.m. Charts	25 0 0				900 12 10
Reports for Press Agencies, &c.	106 11 4		LAND METEOROLOGY:		
Telegrams sent abroad	270 13 2		Observatories and stations, including remuneration of observers..	2,220 14 5	
		693 7 8	Salaries:—Discussion and reduction of observations, &c.	1,191 16 8	
					3,412 11 1
SALE OF INSTRUMENTS, &c.:			WEATHER INFORMATION AND FORECASTS:		
Royal Navy account ..	4 18 2		Telegraphic reports and storm warnings, remuneration of observers, &c.	2,337 7 8	
Mercantile Marine account	35 9 0		Salaries: — Preparation and issue of reports and forecasts	1,888 5 6	
"M.O." (Stations) account	94 12 8				4,225 13 2
		134 19 10	INSPECTIONS:		
Repayment of Miscellaneous commissions executed for Colonial and Foreign institutions, &c...	—	154 6 11	Salaries and travelling expenses	—	436 11 4
Commission charged on work done for Colonies, &c.	—	16 11 8	OCEAN METEOROLOGY:		
			Salaries:—Discussion and reduction of observations	1,200 18 2	
			Expenses incidental to the supply of instruments:—		
			Proportion for care and issue of instruments	440 7 8	
			Royal Navy	319 18 0	
			Mercantile Marine	154 11 5	
			Distant island and coast stations ..	13 17 7	
					2,129 12 10
			Miscellaneous commissions executed for Colonial and Foreign institutions, &c. ..	--	77 4 7
			BALANCE:		
			Cash at Bank	3,643 19 11	
			, at Office	58 12 0	
					3,702 11 11†
		£18,707 4 11			£18,707 4 11

In the year 1899-1900 the sum of £1,403 6*s.* 1*d.* was paid to the Post Office on account of inland and foreign telegrams, allowances to telegraph clerks, rental of private wires, &c.

† At the close of the year, £400 per annum was, with the sanction of the Treasury, assigned as a pension to the retiring Secretary, and £1,500 is required to provide superannuation allowance for a retiring Clerk in the ensuing year.

APPENDIX XX.

List of the Principal Papers printed in various Reports Issued by the Office from the Year 1866.

I.—Daily Weather Report.

Year.	Page.	——
1896 (July to Dec.).	1	Mean Values of Barometric Pressure for each Month and for the Whole Year, derived from Observations made at 8 a.m. daily during the 25 Years 1871–95.
1896	2 and 3	Mean Values of the Dry Bulb and Wet Bulb Temperatures for ditto, ditto.
„	4 and 5	Mean Values of the Daily Maximum and Minimum Temperatures, and of the Maximum and Minimum combined, for the 25 Years 1871–95.
„	6 and 7	Extremes of the Daily Maximum and Minimum Temperatures for ditto, ditto.
„	8	Mean Rainfall for each Month and for the Whole Year—derived from Observations extending over the 30 Years 1866–95.
„	9	Mean Numbers of Hours of Bright Sunshine, with the Percentages of Possible Duration, derived from Observations extending over the 15 Years 1881–95.

II.—Weekly Weather Report.

Year.	Page.	——
1884	V.	Table A.—Showing for each Degree of Latitude, from 49° N. to 58° N. the Total Number of Hours during which the Sun is above the Horizon, in each Month of the Four Quarters of the Year.
„	VI.	Table B.—Showing similar information for each Week of the Year.
1895	VI.–VII.	Mean Values of the Daily Maximum and Minimum Temperatures and of the Maximum and Minimum combined, for each Month and for the Whole Year, derived from Observations extending over the 25 Years 1871 95.
„	VIII.	Mean Rainfall for each Month and for the Whole Year, derived from Observations extending over the 30 Years 1866–95.

Year.	Page.	——
1895	IX.	Mean Numbers of Hours of Bright Sunshine, together with the Per-centages of the Possible Duration, for each Month and the Whole Year, derived from Records extending over the 15 Years 1881–95.
„	[17]	Table I.—Showing for each District, during each of the Three Lustra, and the whole Period comprehended in the 15 Years 1881–95, the Mean Aggregate numbers of rainy days from the beginning of the Year to the end of each week in the Year.
„	[23]	Table II.—Showing in the same detail the Mean Aggregate Amounts of Rainfall.
„	[27]	Table III.—Showing in the same detail the Mean Aggregate Values for Accumulated Heat above 42° F.
„	[32]	Table IV.—Showing in the same detail the Mean Aggregate Values for Accumulated Heat below 42° F.
„	[37]	Table V.—Showing in the same detail the Mean Aggregate Numbers of Hours of Bright Sunshine.
„	[42]	Table VI.—Showing in the same detail the Mean Per-centages of the possible amount of Bright Sunshine.
„	[47]	Table showing in Degrees Fahrenheit for each District, during each of the Three Lustra, and for the whole Period comprehended in the 15 Years 1881–95, the Mean Temperature of the Air, for each week in the Year.
1899	[1-9]	Summaries of Rainfall and Mean Temperature for the First, Second, Third, and Fourth Quarters, and for the Whole Year, during the 34 Years 1866–99. [The separate Yearly Values for 1866-85 are contained in the Reports for 1890, and previous Years.]

III.—Monthly Weather Report.

Year.	Page.	——
1884	[iii.]	Table showing for each Month and for each Degree of Latitude from 18° N. to 49° N. the Total Number of Hours during which the Sun is above the Horizon.
„	[i.]	On London Rain. By W. J. Russell, Ph.D., F.R.S.
„	[ii.]	On the Amount of Carbonic Acid in London Air. By W. J. Russell, Ph.D., F.R.S.
1885	[i.]	On the Impurities in London Air. By W. J. Russell, Ph.D., F.R.S.
„	[ii.]	Table showing the Mean Monthly and Annual Rainfall at the Weekly and Monthly Weather Report Stations for the 20 Years 1866 to 1885.

IV.—Quarterly Weather Report.

Year.	Page.	——
1869	43	Factors for Calculation of Gradients.
„	[1]	Notes on Easterly Gales, by R. H. Scott.
1870	iii.	Description of Observatories, with illustrations of thermometer screens.
„	[23]	Bessel's Paper on the Determination of the Law of a Periodical Phenomenon. Translated from the Astronomische Nachrichten, 136, for May, 1828.
1871	[7]	Discussion of Anemometrical Results for Orkney, 1863–68.
„	[59]	Constants for the Determination of the Monthly March of Atmospherical Pressure, &c. at the Seven Observatories for 1869–70.
1872	[13]	Discussion of the Anemometrical Results at Bermuda from 1st April 1859 to 31st March 1863.
1873	[13]	Rainfall of the London District for Sixty Years, 1813–72. By G. Dines, F.M.S. [with diagram].
1874	[26]	On the Winds at Liverpool. By W. W. Rundell.
1875	[1]	Observations taken at Nine Stations of the Second Order [1875].
„	[89]	Mean Monthly Results for the Seven Observatories for the Lustrum, 1871–75.
1876	[13]	Report on the Reduction of Greenwich Curves for 1875 to a Common Standard with those of Kew [with 25 plates].
„	[20]	Results of Observations made at the Pagoda, Kew Gardens, to Determine the Influence of Height on Temperature, &c. By R. H. Scott, F.R.S. [4 plates.]
„	[39]	Comparison of Results obtained by means of the Harmonic Analyser, with similar Results got from Measurement and Numerical Calculation for the Seven Observatories.
1877	[13]	On the Diurnal Range of Rainfall at the Seven Observatories in connexion with the Meteorological Office, 1871–80. By R. H. Scott, F.R.S. [5 plates.]
„	[35]	Report on Evaporimeters. By W. N. Shaw, M.A. [2 plates.]
1878	[13]	On the Computation of the Quantity of Heat in excess of any Fixed Base Temperature, received at any place during the course of the Year, &c. By Lieut.-Gen. Strachey, R.E., F.R.S.
1879	[13]	Report on Experiments made at Strathfield Turgiss in 1869 with Thermometer Stands or Screens of various patterns, &c. By F. Gaster.
„	[41]	Report on Hygrometric Methods, &c. Part I. By W. N. Shaw, M.A.
1880	[13]	Report on Experiments made at the Kew Observatory with Thermometer Screens of different patterns during 1879, 1880 and 1881. By G. M. Whipple, Superintendent.
„	[19]	Tables and Diagrams illustrating the Diurnal Range of Barometric Pressure in the British Isles during the Years 1876–80. By F. C. Bayard, LL.M., F.R. Met. Soc. [5 plates.]

V.—Report of the Meteorological Committee of the Royal Society.

Year.	Page.	——
1867	27	A Description of the Self-recording Instruments recently erected by the Meteorological Committee of the Royal Society in various parts of the United Kingdom. [With plates.]
1869	25	Note upon a Self-registering Thermometer adapted to Deep-Sea Soundings, by W. A. Miller, M.D., Treasurer and V.P.R.S., extracted from Proceedings of Royal Society, vol. XVII., p. 482.
1869	36	Description of a Self-recording Rain-gauge, invented by Robert Beckley, of the Kew Observatory; made by James Hicks, London.
1870	25	Description of the Process by which the Traces of the Self-registering Instruments are reduced suitably for publication.
1872	27	A Summary of the Results obtained from the Discussion of the Information for Square 3, being the Region of the Doldrums in the Atlantic. By Capt. H. Toynbee, Marine Superintendent.
1874	33	The International Maritime Conference.

Va.—Report of the Meteorological Council.

Year.	Page.	——
1877–78	21	Account of the Experiments on Atmospheric Electricity conducted at Kew Observatory. By Prof. J. D. Everett.
1879–80	28	On the Effect of Sluggishness on the Readings of Marine Barometers on Shore, by Prof. Stokes.
„	43	On the Methods available for the Determination of the Humidity of the Atmosphere, by W. N. Shaw.
„	46	Memorandum as to the Employment of the Harmonic Analyser in the Meteorological Office, by Prof. Stokes.
1880–81	25	On the Working of the Harmonic Analyser. [Prof. Stokes.]
„	27	Report on Fogs. [W. J. Russell.]
„	28	„ „ Hygrometers and Evaporimeters, presented to the Meteorological Council, May 10, 1881. [W. N. Shaw.]
1881–82	25	On fogs. [W. J. Russell.]
„	29	Report on the Results of a Tentative Reduction of a Year's Electrograms at the Kew Observatory. [G. M. Whipple.]
1882–83	27	On the Results obtained by the use of the Harmonic Analyser.
1884–85	22	Note on Work done with the Harmonic Analyser.
1885–86	22	Memorandum on Cloud Photography, by Prof. Stokes, F.R.S.

Year.	Page.	——
1886–87	21	On the Distribution of Gales round the Coasts of the British Isles [for the 15 years, 1871–85].
1887–88	22	On the History of the Severe Storms which visited the British Isles between August 1, 1882, and September 3, 1883, as traceable from the Atlantic Charts published by the Office. By Robert H. Scott, F R.S., Secretary.
„	30	Abstract of Report on Hygrometric Methods, by W. N. Shaw, M.A., reprinted from the "Proceedings of the Royal Society," No. 262.
1888–89	22	Notes of some Results of an Examination of Atlantic Charts published by the Office, by R. H. Scott, F.R.S., Secretary.
„	27	Memorandum on the Measurement of Squalls shown on the Traces yielded by Robinson Anemometers of the "Standard" Pattern, by R. H. Curtis.
1889–90	24	Code of Regulations, &c. for conducting the work at the First Class Observatories, and the Examination thereof. [*See* also Report, 1868.]
„	36	Note on Experiments on Pressure of Wind made by W H. Dines.
„	46	Experiments with Violle's Actinometer Apparatus.
„	47	On the Work done with the Harmonic Analyser a the Meteorological Office.
1890–91	22	On Mr. Dines' Anemometer Experiments.
1891–92	23	On Anemometer Comparisons carried out by the aid of a Grant from the Meteorological Council, by W. H. Dines, B.A.
1892–93	21	On the Construction of the Anemometer recently erected for trial on the roof of the Meteorological Office, by W. H. Dines, B.A.
„	27	On the Harmonic Analysis of Hourly Observations of Air Temperatures at British Observatories, by Lieut.-Gen. R. Strachey, F.R.S.
1894–95	22	Report on Weather Forecasts during the Hay Harvest of 1894, by H. N. Dickson.
„	27	Report on the Comparisons made between two Pressure Tube Anemometers on the roof of the Meteorological Office, by R. H. Curtis.
„	29	Note on the Exposure of the Robinson Anemometer at Holyhead, by R. H. Curtis.
1895–96	24	Note on Anemometer Experiments, by R. H. Curtis.
1897–98	21	Report upon Anemometer Experiments at Holyhead, by R. H. Curtis.
„	28	Description of the Bridled Anemometer designed by Sir G. G. Stokes, Bart., F.R.S., by R. H. Curtis.

VI.—HOURLY READINGS of the SELF-RECORDING INSTRUMENTS of the OBSERVATORIES in connexion with the METEOROLOGICAL OFFICE.

Year.	Page.	——
1883	[1]	Constants of formulæ expressing the mean daily range of temperature obtained by the use of the Harmonic Analyser.
1884	[1]	Tables and formulæ to facilitate the computation of harmonic coefficients. By Lieut.-General Strachey, R.E.

VII.—HOURLY MEANS of the READINGS obtained from the SELF-RECORDING INSTRUMENTS at the FIVE OBSERVATORIES under the METEOROLOGICAL COUNCIL.

Year.	Page.	——
1891	[1]	Tables of Hourly Sunshine Values, with Plates, for the Ten Years 1881–90, for Seven Observatories.
1895	[6–80]	Mean Hourly and Extreme Values of Pressure and Temperature, and Amount and Frequency of Rainfall, for each month of the 25 years, 1871–95; also Amount and Frequency of Sunshine for each month of the 15 years, 1881–95.

VIII.—METEOROLOGICAL OBSERVATIONS at STATIONS of the SECOND ORDER.

Year.	Page.	——
1891	[186]	Results of Observations at Stations of the Second Order for the Fifteen years, 1876–90.

APPENDIX XXI.

LIST OF PUBLICATIONS ISSUED UNDER THE AUTHORITY OF THE METEOROLOGICAL COUNCIL.

The list is arranged under the following headings :—

1. Periodical Publications and Reports.
2. Occasional Publications.
3. Instructions in the use of Instruments.
4. Marine Meteorology.
5. Miscellaneous Publications.

1. Periodical Publications.

Daily Weather Report. (Issued to Subscribers only.) Subscription, £1 per annum.

Weekly Weather Report. With Appendices and Monthly Supplements priced separately :—

*1888. Vol. V. (Official, No. 85.) 4*d.* per week. Annual subscription, including Supplements and Appendices, 21*s.* 2*d.*

1889–1900. Vols. VI.–XVII. (Official, Nos. 86, 87, 96, 100, 107, 111, 116, 121, 128, 133, 138, 144.) 6*d.* per week. Annual subscription, including Supplements and Appendices, 30*s.*

Monthly Weather Reports :—

1884. (Official, No. 62.) Jan.–March, May–Nov., 1*s.* 6*d.* each ; April (with two Appendices), 2*s.* 6*d.* ; Dec., 1*s.* 9*d.*

1885. (Official, No. 65.) Jan. to Dec., 1*s.* 6*d.* each

1886. (Official, No. 68.) Jan. to Dec., 1*s.* 6*d.* each.

†1887. (Official, No. 77.) Jan. to April, 1*s.* 6*d.* each ; May to Dec., in wrapper, 12*s.*

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* The publication of the Weekly Weather Report began in February 1878. Annual subscription, including supplements and appendices, post paid, 1878–1883, 12*s.* 6*d.* ; 1884–1887, 21*s.* 2*d.*

† The publication of the Monthly Weather Report was continued after this date as a Supplement to the Weekly Weather Report.

1. Periodical Publications—*continued.*

Quarterly Weather Reports :—

1869. (Official, No. 7.) Parts I. to IV. 5*s.* each.
1870. (Official, No. 9.) Parts I. to IV. 5*s.* each.
1871. (Official, No. 14.) Parts I. to IV. 5*s.* each.
1872. (Official, No. 16.) Parts I. to IV. 5*s.* each.
1873. (Official, No. 19.) Parts I. to IV. 5*s.* each.
1874. (Official, No. 25.) Parts I., II., and IV., 5*s.* each; Part III., 5*s.* 9*d.*
1875. (Official, No. 30.) Parts I. to IV. 5*s.* each.
1876. (Official, No. 33.) Part I., 6*s.*; Parts II., III., and IV., 5*s.* each.
1877. (Official, No. 52.) Part I., 10*s.*; II., 5*s.*; III., 4*s.* 6*d.*; IV., 6*s.*; Appendices and Plates, 27*s.*
1878. (Official, No. 55.) Parts I. to IV., 6*s.* each. Appendices and Plates, 28*s.*
1879. (Official, No. 49.) Parts I. to III., 6*s.* each; IV., 5*s.* 6*d.*; Appendices and Plates, 27*s.*
1880. (Official, No. 50.) Parts I. and II., 6*s.* each; III., 4*s.*; IV., 6*s.*; Appendices and Plates, 28*s.*

ANNUAL Volumes :—

Reports of the Meteorological Committee :—

1867. (Official, No. 1.) 1*s.*
1868. (Official, No. 5.) 5*d.*
1869. (Official, No. 6.) 10*d.*
1870. (Official, No. 10.) 10*d.*
1871. (Official, No. 15.) 10*d.*
1872. (Official, No. 17.) 1*s.*
1873. (Official, No. 22.) 4*d.*
1874. (Official, No. 26.) 6*d.*
1875. (Official, No. 29.) 4*d.*
1876–77. (Official, No. 31.) 3*s.* 5*d.*

Reports of the Meteorological Council :—

1877–78. (Official, No. 35.) 1*s.*
1878–79. (Official, No. 38.) 5*d.*
1879–80. (Official, No. 41.) 1*s.*
1880–81. (Official, No. 42.) 1*s.* 2*d.*
1881–82. (Official, No. 48.) 1*s.*
1882–83. (Official, No. 58.) 10½*d.*
1883–84. (Official, No. 64.) 1*s.* 2*d.*
1884–85. (Official, No. 67.) 4*s.* 4*d.*

1. Periodical Publications—*continued.*

ANNUAL Volumes—*continued.*

Reports of the Meteorological Council—*continued.*

1885–86. (Official, No. 72.) 8*d.*
1886–87. (Official, No. 75.) 8*d.*
1887–88. (Official, No. 79.) 1*s.*
1888–89. (Official, No. 84.) 5½*d.*
1889–90. (Official, No. 91.) 7½*d.*
1890–91. (Official, No. 99.) 5½*d.*
1891–92. (Official, No. 104.) 6*d.*
1892–93. (Official, No. 109.) 8*d.*
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For the Year ending 31st of March, 1901,

TO THE

PRESIDENT AND COUNCIL

OF THE

ROYAL SOCIETY.

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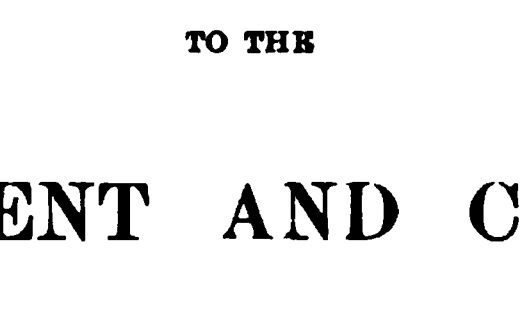

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REPORT

OF THE

METEOROLOGICAL COUNCIL,

For the Year ending 31st of March, 1901,

TO THE

PRESIDENT AND COUNCIL

OF THE

ROYAL SOCIETY.

In common with all Her subjects, the Council have shared in the profound sorrow at the death of Her late Majesty Queen Victoria, and in the loyal and dutiful sympathy expressed to His Majesty the King and the Royal Family in their bereavement.

The Council recall especially the occasions of the Queen's journeys across the sea, and particularly the memorable and gracious journey to Ireland in April, 1900.

On these occasions the Meteorological Office was called upon for special service in the supply of information to the Royal Yacht. With the knowledge of the Queen's interest in their work the memory of this service will always be cherished.

Constitution of the Council.

The appointment reported last year of Mr. W. N. Shaw, a member of the Council, to fill the office of Secretary on the retirement of Mr. R. H. Scott, necessitated some provision for making up the statutory number of members of the Association, which was incorporated under the Companies Acts in 1891 with the name of the Meteorological Council (Report, 1891, p. 25). From the constitution of the Council it became necessary that the question should be referred to the President and Council of the Royal Society, who appointed a Committee to consider whether any changes in the constitution and duties of the Meteorological Council were desirable, and invited the Council to nominate two of its members to act on the Committee with those nominated by the Royal Society.

As a result of these deliberations, the President and Council of the Royal Society decided that the Meteorological Council should consist of not less than seven and not more than ten members, of whom a limited number—four in the first instance, in addition to the Hydrographer to the Admiralty—should be designated Directors; that the control of the business of the Council should be vested in the Directors for the time being, who should receive remuneration for their services.

Upon being informed of this decision of the Royal Society, the Council at once took steps to give legal effect to it, and, in consultation with Mr. A. B. Kempe, Treasurer of the Society, drafted and carried out the necessary alterations in the Articles of Association, and thereupon reported the completion of the arrangements to the Royal Society.

The Council were subsequently informed by letter, dated March 26th, 1901, that the President and Council of the Royal Society had appointed the existing members of the Council (with the exception of Mr. F. Galton, who had expressed a wish to retire), in addition to the Hydrographer to the Admiralty, to be Directors, with Sir R. Strachey as Chairman; and, further, that they had appointed as additional members of the Council The Earl of Rosse, K.P., and Mr. J. Y. Buchanan for five years; Mr. W. H. Dines, President of the Royal Meteorological Society, Professor Arthur Schuster, and Mr. R. H. Scott for three years.

The Directors formally took over the control of the business of the Council at a meeting held on April 10th, 1901.

The correspondence referring to the reconstitution of the Council is printed in Appendix I., p. 36, together with the modified Articles of Association.

Retirement of Mr. F. Galton.

The retirement of Mr. F. Galton brings to a close a long tenure of office, which has been characterised throughout by the activity and energy devoted to the discharge of its duties. Mr. Galton was a member of the original Meteorological Committee appointed in 1866, and became a member of the Council after the revision of the arrangements in 1876. His work for the Office was especially noteworthy on account of his wide knowledge of meteorological instruments and his ingenuity in devising means for improving them, as well as for representing graphically the results obtained with them.

The care which he devoted to the selection of suitable phraseology has done good service to the science of meteorology. The term "anticyclone" originally suggested by him has passed into the current language of the subject.

Mr. Galton was Chairman of the Committee of Kew Observatory from 1889 until the Observatory was taken over as a department of the National Physical Laboratory at the end of 1899. His tenure of this position, with respect to the principal Observatory in connexion with the Office, was very advantageous, and enabled the Council to develop the satisfactory systems of examination of automatic records and of inspection of instruments, which are characteristic of the British Meteorological Service.

Mr. Galton retires on account of advancing age, and he carries with him in his retirement the cordial appreciation of his work by his colleagues on the Council.

National Antarctic Expedition.

At the request of the Hydrographer, the Council undertook the arrangements for supplying the meteorological instruments required by the Admiralty for the use of the National Antarctic Expedition. The instruments are for the most part only slightly modified forms of those in use at meteorological stations in this country or on board British ships, but the sunshine recorders required considerable modification because they had to be designed to register sunshine throughout the twenty-four hours during a considerable part of the year. After consultation with Sir G. G. Stokes, two instruments have been constructed which can be used for registration during the twenty-four hours, or for a shorter period, and at the same time a special form of card has been constructed to receive the record.

The Council have also undertaken the arrangements for supplying additional apparatus for experimental meteorological work, at the request of the Committee of the Expedition.

The cost of the instruments supplied to the Expedition which do not form part of the usual equipment for meteorological observations on board His Majesty's ships, is borne by the Admiralty, or by the Committee of the Expedition.

In compliance with a request from the Committee of the Expedition, the Council have made special arrangements for transcribing from meteorological logs in their possession all the meteorological data for the region between latitude 50° S. and 60° S. and from longitude 120° E. eastward to 130° W. A contribution to the cost of this work will be made by the Committee to cover the special incidental expenses.

Observations on board the "Southern Cross" and at Cape Adare.

At the request of the Royal Society the Council have undertaken the tabulation and preparation for the press of the meteorological observations by Mr. Bernacchi and others on board the ship "Southern Cross" and at Cape Adare, the land station of the Antarctic Expedition recently sent out by Sir G. Newnes. Incidentally, this work has been of great service to the Council in enabling them to form an opinion upon the working of various instruments, and, in particular, of the barograph, thermograph, and sunshine recorder, which formed part of the equipment of the "Southern Cross" Expedition. They have been enabled

to make use of this information in arranging for the supply of instruments to the National Antarctic Expedition.

Forecasts of fog for the London district.

In the autumn of last year the Council received a number of applications from the officials of electric lighting companies and others for a special service of forecasts of fog for London and the neighbourhood during the winter months. The Council fully recognise the desirability and the importance of such a service, but they are of opinion that to carry it out effectively a much more detailed knowledge of the special meteorological conditions of the several districts of London would be required than that which is now available. They have not the means of obtaining the necessary information from the various districts, and the funds at their disposal are not more than sufficient to enable the Office to deal generally with the meteorology of the British Isles and neighbouring seas and of the oceans traversed by British ships; moreover, they have no staff at their disposal by whom the special investigation of the meteorological conditions of any particular district can be undertaken.

Such local investigations seemed to the Council to fall to the duty of the local authorities, and the Council have accordingly addressed a letter to the County Council of London suggesting the lines upon which an effective investigation might be conducted. The Council have reason to believe that the subject has been under the consideration of a committee, but they have not yet (June, 1901) received the reply of the County Council to the suggestion.

In the meantime they have been called upon to supply one of the local authorities of the London district with daily forecasts having special reference to the occurrence of fogs.

International Committee.

By direction of the Council, the Secretary attended the open Congress of Meteorologists at Paris in September, 1900, and the meetings of the International Committee, of which he was elected a member, in succession to Mr. R. H. Scott. The subject of most practical international importance brought before the Committee was the question of international arrangements for the acceleration of weather telegrams from the observing stations to the central offices of the various countries, and the establishment of uniform hours of observation. In this matter Great Britain occupies a very special position on account of the geographical situation of the islands with reference to the approach of weather changes, a large proportion of which are from the west.

Observations at 7 a.m.

The matter is regarded by the Continental weather offices as of such importance that, as already reported (Report for 1899–1900, p. 6), the Deutsche Seewarte requested the Council to make special arrangements for daily observations at 7 a.m., with a special service of telegrams reporting the observations to Hamburg. The request was followed up by a similar one from Holland, and this service has been in operation since May last. The Council have now before them an application from the Seewarte for the extension of the arrangement to other stations and the discontinuance of the 8 a.m. service to Germany.

In connexion with these matters, the Council have had under consideration the advantages that might result from changing the

hour of observation at the British stations from 8 a.m. to 7 a.m., the common hour of observation on the Continent. They are of opinion that if the change were carried out with the effective co-operation of the Post Office the service of weather telegrams could be made much more prompt and efficient in this country and for the whole of Western Europe, and the weather reports could be brought out in time to catch the mid-day mails and reach a much larger number of persons in the British Isles on the day of issue than at present.

There are, however, associated with the matter questions of additional expense and re-organisation, and the Council have not yet seen their way to take any active step in the matter.

Magnetic observations at Valencia.

At the request of the late Professor G. F. Fitzgerald the Council have sanctioned an arrangement for regular magnetic observations at the observatory at Valencia (Cahirciveen). The cost of the observations is defrayed from a fund controlled by the Earl of Rosse.

Supply of information to the Public.

In order to make the information as to the facilities which the Office affords to the public more accessible, the Council have had a memorandum prepared in which those facilities are briefly explained. The memorandum is reprinted in Appendix II. to this Report, and copies can be obtained upon application to the Secretary.

Acknowledgments.

In the discharge of the duties entrusted to them the Council have to rely largely upon the help of volunteer observers at sea and on land, and they desire to record their recognition of the assistance thus afforded them, and their appreciation of the care and skill that have been devoted to securing accurate and regular records.

They have on this occasion specially to acknowledge their indebtedness to the Portuguese Government for the continuation of the daily telegrams from the Azores; to Mr. T. G. Benn, of Newton Reigny, Penrith, who furnished, at his own expense, a daily telegraphic report of observations at 8 a.m. from October 1st, 1900, till March 31st, 1901, and thus supplied valuable information for the North-Western district of England, which is not fully represented in the Daily Weather Chart: Mr. Benn also checked the daily forecasts for the North-Western district; to the Corporation of Bath who, through their Medical Officer, Dr. W. H. Symons, has sent a similar daily telegram since January 18th; to Mr. Glyde, of Tavistock, for occasional telegrams reporting observations of cirrus cloud; to the local authorities of Clacton-on-Sea, Hastings, Eastbourne, Brighton, Worthing, Llandudno, Rhyl, and Southport, who send telegraphic information of sunshine; to Mr. A. Cresswell, of the Birmingham and Midland Institute, Mr. Mainland, of the Gillibrand Meteorological Observatory at Darwen, and Professor Schuster, of Manchester, who send daily reports of evening observations by post, and thus enable the Council to supplement the telegraphic reports with useful information as to the state of the weather at inland stations on the previous day.

Administration.

The administration of the Office is conducted by the Secretary, under the direction of the Council, with the assistance of the Marine Superintendent and a staff of 39 clerks and attendants.

At the close of last year, Mr. R. Strachan was granted an annuity, under the new scheme of Superannuation, after long and meritorious service. He was transferred from the Board of Trade at the establishment of the Office, was for many years in charge of the Instruments' Department, and contributed several useful memoirs on the Meteorology of the Arctic and Antarctic regions, compiled from the records of the various expeditions that have been sent to those regions.

Summary of the work of the Office.

The work of the Office may be briefly summarised under the following heads:—

I. OCEAN METEOROLOGY.—The collection, tabulation and discussion of meteorological data for all parts of the ocean traversed by British ships. The preparation and issue of charts or other publications exhibiting the results obtained from the discussion of the observations.

The issue of meteorological instruments for use on board the ships of the Royal Navy, and for observers belonging to the Merchant Service, with which is associated the supply of instruments to the Telegraphic Reporting Stations, &c.

II. WEATHER TELEGRAPHY.—The collection of observations transmitted by telegraph, three times in each day, from selected stations in the British Isles (chiefly on the coasts), and on the Continent of Europe, the preparation of a Daily Report embodying the observations, and of forecasts of weather based upon them, and the issue of warnings to ports on the coasts of the United Kingdom whenever there are indications of the approach of severe storms.

III. CLIMATOLOGY.—The collection of information of various kinds from observatories and other land stations in the British Isles, and from a few stations in British possessions or in Foreign countries, with the view of extending the accurate knowledge of the meteorological conditions obtaining in the various districts in which the observations are made, and of the changes to which they are subject.

IV. LIBRARY.—For the collection and preservation of weather maps and other publications issued by the Colonies and Dependencies of the British Empire, and by Foreign Countries, so that they may be available for consultation by those requiring information as to the weather in various parts of the globe.

V. MISCELLANEOUS INVESTIGATIONS.

VI. PUBLICATIONS.

VII.—FINANCE.

All the branches of the Office are utilised for the preparation of replies to inquiries on questions connected with the weather, which are made from time to time by public bodies or by private persons.

Details of the work of the Office during the past year are given below under the headings which have been enumerated.

PART I.

Ocean Meteorology.

Collection of Information.

Collection of Information.—The Office has continued the systematic collection of data with respect to the meteorology of the ocean, and for this purpose complete outfits of meteorological instruments have been supplied to selected officers of merchant ships who were willing to make observations at sea.

The instruments supplied are :—

One barometer; six thermometers, with a screen; four hydrometers.

His Majesty's ships also are supplied with instruments, which, however, differ slightly from those lent to the Mercantile Marine. The Council continues to receive valuable observations from the officers of the Royal Navy.

Agents.

In order to facilitate the supply of instruments to the Mercantile Marine, agencies are established at Cardiff, Dundee, Glasgow, Greenock, Hull, Liverpool, and Southampton. A list of the agents is given in Appendix II., p. 53.

Sets of instruments are kept in working order at the Office in London, and at each agency, for the purpose of instructing observers in the method of observation. Notices to captains as to the supply of instruments are frequently distributed from the Office.

Supply of instruments to ships.

The number of merchant ships supplied with instruments and log books during the year has been 83. Taking into account the ships which had instruments in their possession at the beginning of the year, the approximate number of ships of the merchant service employing instruments belonging to the Office for observations during the year was 169.

Appendix III. (p. 68) contains a list of the observers who have, during the past year, contributed logs classed as "excellent." The Council take this opportunity of expressing their best thanks to those who have thus assisted them. Several of these observers have co-operated with the Office for many years. The names which appear in the list for the first time are as follows :—

Observer's Name.	Ship.
Holmes, W. B.	S.S. "Matatua."
Martyr, J. W. C.	S.S. "Montrose."
Mitchell, J.	S.S. "Prome."
Woolfall, A.	S.S. "Amasis."

Death of observers.

The Council have to note with great regret the death of five of their old observers. Capt. Peter Murdoch died at Valparaiso in November, 1900. He had for many years been an observer for the Office, and had kept 22 meteorological logs, of which 20 were classed as excellent. Capt. W. Martin, R.N.R., died at the Cape in January, 1901. Capt. H. W. Dyke, ship "Rathdown," had kept several excellent logs for the Office. His vessel disappeared with all hands between Japan and Oregon. Capt. W. H. Smith, R.N.R., had kept 22 meteorological logs, of which 18 were excellent. Capt. Gilbert Shaw had kept 29 logs for the Office.

Logs received.

The meteorological logs received during the year numbered 120, of which 103 were either "excellent" or "very good."

A list of the logs received is given in Appendix IV. (p. 69).

The following list shows the number of vessels observing, for the different lines of route :—

North Atlantic	29	Eastern, via Suez Canal...	14
Mediterranean	4	Far Eastern, via Cape of Good Hope	15
South America (East Coast)	8	Far Eastern, via Suez Canal	18
„ „ (West „)	3	Pacific	37
South Africa	10	Polar	1
Eastern, via Cape of Good Hope	1		

Recognition of "excellent" observers.

As a mark of recognition of valuable co-operation, the Council present various publications of the Office (*see* Appendix XIV., p. 148) to observers who return well-kept logs.

The Council desire to note specially that they have continued to receive, through the Ocean Steamship Company of Liverpool, a considerable number of logs, principally relating to voyages to and from the China Seas viâ Suez.

Observations from the Pacific Ocean.

Observations from the Pacific Ocean.—The arrangements described in the Report for 1898, p. 8, and also in the Report for 1900, p. 10, for the supply of instruments from His Majesty's Dockyards at Sydney and at Hong Kong to the Commanders of the Canadian-Pacific Railway Company's Steamers, and Canadian-Australian Steamship Company's Steamers have been in operation. The observations contained in these logs are of special importance in regard to the material which they afford for the gradual improvement of the Current Charts for the Pacific Ocean issued by the Office.

Observations of Drift Ice in Northern Seas.

On behalf of the Danish Meteorological Institute, which has undertaken a work having for its object the collection of information in regard to the state of the ice in the waters East and West of Greenland and elsewhere, within the limits of Arctic navigation, between the months of March and August inclusive, the Office has secured the co-operation of several Captains voyaging to the Arctic.

Use of the information collected.

The information contained in the meteorological logs is chiefly used in the preparation of statistical results for different oceans, which are issued as separate publications either by H.M. Stationery Office or by the Hydrographic Department of the Admiralty.

Publications

In the past year the *Charts illustrating the Weather of the North Atlantic Ocean in the Winter of 1898–99* have been published by the Stationery Office, and the work on the *Wind Charts of The East and West Coastal Regions of South America* for the Hydrographic Department has been nearly completed. Considerable progress has been made with the work on the Meteorology of the South Atlantic.

Pilot charts of the North Atlantic and Mediterranean.

During the year the Council have made arrangements for the preparation and issue of a series of Monthly Pilot Charts of the North Atlantic and Mediterranean to commence with April, 1901. The statistical information which is contained on the charts is largely derived from previous publications of the Office, but the Council have also to acknowledge their obligation to the publications of the United States Weather Bureau and the Deutsche Seewarte for supplementary information of interest and importance to seamen. The charts are to be sold by the agents for the sale of Stationery Office publications at 6*d.* for a single copy, and the Board of Trade have kindly made arrangements whereby captains and officers of the Mercantile Marine can obtain copies at the Mercantile Marine Offices of a large number of ports.

By the issue of these charts the Council desire to make the information collected in the Office for many years more generally accessible. They hope also to add to the charts each month the most recent information as to the position of ice in the North Atlantic and other matters of interest to seamen. They have accordingly solicited the co-operation of the various Steamship Companies and Mercantile Marine Associations, and have received promises of assistance from the following: White Star; Cunard; American; Dominion; Johnston; Allan; Elder Dempster; Norfolk and North American; Messrs. Scrutton, Sons & Co.; Liverpool Steamship Owners' Association; Liverpool Shipowners' Association; Mercantile Marine Service Association; Merchant Service Guild; and London Shipmasters' Society.

Information supplied for the Admiralty.

Climatological Information for the Admiralty.—Statistics as to the climates of foreign ports are from time to time required by the Admiralty for use in various publications; information has been supplied bearing upon the climatic conditions of the shores of the Red Sea and gulf of Aden; meteorological results for Ascension, St. Helena and Tristan d'Acunha; also for various places in the Bay of Bengal.

Various hydrographic notices are extracted from the meteorological logs and forwarded to the Admiralty. Among those sent during the year were notes by Captain G. Mitchell, S.S. "California"; Captain J. S. D. Phillips, S.S. "Warrimoo"; Captain W. D. G. Worcester, R.N.R., S.S. "India"; Captain W. Anderson, Barque "Loch Katrine"; Captain T. R. Evans, Barque "Conway Castle."

Data have been obtained, and forwarded to Sir Norman Lockyer, bearing upon the distribution of cloud over the Atlantic and over Asia and the neighbouring seas during the solar eclipses of January 22nd, 1898, and May 28th, 1900.

Supply and Stock of Instruments.

Supply of instruments to Royal Navy.

The total number of instruments supplied to the Royal Navy during the year ended March 31st is 1,082. Particulars of these instruments are given in Appendix V. (p. 78) which includes a statement of the stock of instruments for this purpose standing on the books on March 31st, 1901, and of their distribution.

Supply of instruments to Mercantile Marine, &c.

Appendix VI. (p. 79) gives similar information with regard to other instruments belonging to the Office which have been supplied to the Mercantile Marine, to Observatories, to Telegraphic Stations, or which remain in store.

Instruments are occasionally lent to observers in unfrequented parts of the world when the Council have reason to believe that the observations will be taken with due care, and the observers undertake to send copies of their observations to the Office.

Instruments for New Guinea.

In May, 1900, the Council received an application from the Acting Government Secretary, British New Guinea, for six sets of instruments for stations in New Guinea. Some years ago a similar request for three sets had been complied with, but no return of observations had been made. The Council recognize the importance of observations in that region, and after some correspondence with the Agent-General for Queensland, they were assured that the returns would be regularly made, and the six sets of instruments were accordingly supplied.

Instruments for Sabang Bay.

Instruments have also been supplied for use at a new signal station established by Lloyd's at Pulo Wai, Sabang Bay, upon similar conditions.

Fishery Barometers.

Fishery Barometers.—Barometers are lent by the Office to fishing villages and other places on the coast for the benefit of sailors and fishermen. There are 226 stations of this kind, of which 67 are in England, 7 in Wales, 64 in Ireland, 83 in Scotland, 4 in the Isle of Man, and 1 in Jersey. A list of the stations is given in Appendix II., p. 53.

During the past year barometers have been supplied to Inniscoo Island, on the recommendation of the Coastguard Authorities; to Kyle of Lochalsh, on the application of Mr. J. G. Weir, M.P.; to Ullapool, on the application of the Fishery Board for Scotland, to replace one supplied in 1892 and maliciously damaged under such circumstances that no blame could be attached to those in whose care the instrument was placed; to Glenarm, on the application of the Chief Officer of the Coastguard; and to Marvaig, on the application of the Fishery Board for Scotland.

The fishery barometer is in each case placed in charge of some responsible person who undertakes the duty of forwarding to the Office a chart of the readings of the barometer and thermometer during each month.

PART II.

Weather Telegraphy and Forecasts.

Daily weather Reports.

A report giving the state of the weather over the British Isles and the adjacent parts of the Continent at 8 a.m. and the changes which have taken place in the previous 24 hours is issued by the

Office at 11 a.m. each day except Sundays and Bank Holidays, together with forecasts of the probable weather over the United Kingdom for the period ending at noon on the following day. A second report referring to the weather at 6 p.m., with forecasts for the following civil day, is issued each evening for the morning editions of the daily papers.

Telegraphic reporting stations.

For the purposes of these reports the arrangements made for daily observations at 25 stations in the British Isles, at 8 a.m. and 6 p.m., to be reported by telegram to the Office, have been continued. Telegraphic messages are also received from 18 stations on the Continent. Messages are sent from a selection of the stations immediately after the 6 p.m. observations, and all send full reports after the morning observations, a certain number also report 2 p.m. observations. The hours of observation on the Continent do not in all cases correspond with those of the British stations.

The Telegraphic Reporting Stations in the British Isles are those marked with the letter "T" in the list given in Appendix II. (p. 56), and the same Appendix contains at p. 61 a list of the Foreign Stations which send daily telegrams to the Office.

In addition to the stations which belong to the regular service of the Office the Council have had the advantage of daily telegraphic reports from the Azores (through the courtesy of the Portuguese Government), from Newton Reigny, Penrith, and from Bath (*see* p. 9).

Inspection of the Stations.

Inspection of the Telegraphic Reporting Stations.—The stations in the United Kingdom are regularly inspected. The Reports of the Inspectors for the past year have shown that efficiency has been maintained.

The Daily Weather Report.

Discussion and Publication of the Information received.—A detailed account of the manner in which the meteorological information received by telegraph is utilised for the preparation of the Daily Weather Report was last given in Appendix X. of the Report for 1891. The Report has appeared regularly during the year.

From August 1st, 1900, some modifications have been introduced into the form of the Report. The morning and evening observations of the Telegraphic Reporting Stations appear on the first page as usual, but the two charts on the second page, representing the morning distribution of pressure, wind and sea, and of temperature and weather respectively, are supplemented by three smaller charts. One represents the barometric distribution over the whole of Europe at 8 a.m. of the preceding day in order that the general atmospheric changes may be more readily traced. Another represents mean morning isotherms for the British Isles for periods of one or two months, so that the distribution of temperature for the day may be easily compared with the normal distribution for the season as estimated for a period of twenty five or thirty years. The third represents the distribution of mean maximum or minimum temperature estimated in a similar manner. These charts may be varied from time to time to represent other statistical results of interest.

The forecasts on the third page are drawn up in the same way as before, but the synopsis of the "Situation at 8 a.m." and the statement of the probable changes in the system now prevalent have been remodelled so as to give a more effective idea of existing conditions and the changes indicated thereby.

There are also changes on the fourth page of the Report. Instead of "General Remarks on the Weather over Europe" there is a table giving the latest information in the possession of the Office as to maximum and minimum temperature, rainfall, and weather at selected stations on the Continent and elsewhere which are beyond the area represented by the telegraphic reports. This has been introduced to meet a suggestion of Sir W. Harcourt that the Report should give the latest information in the possession of the Office that might be useful to travellers on the Continent and elsewhere. The selection of the stations is accordingly determined by the current interests of travellers, and is varied from time to time according to the information available.

The information as to the weather in the British Islands is supplemented by telegraphic reports sent daily from volunteer observers, by data as to sunshine for the preceding day from a number of coast stations which report by post, and by postal reports of maximum and minimum temperature, rainfall, and sunshine for a number of inland stations which have proved a useful addition to the telegraphic reports of the first page.

For convenience of reference a small supplemental table gives the Greenwich time of sunrise, noon, and sunset for four selected stations in the British Isles, so that the variation in the duration of daylight and the standard times of local noon for any locality may be ascertained.

Distribution of Daily Weather Reports.

Hitherto the issue of the reports has been confined to certain public offices and institutions, and to annual or quarterly subscribers. The distribution has been by hand or by book-post. The area within which delivery can be effected on the day of issue is necessarily very limited. About 250 copies are distributed without charge to newspapers, for public exhibition at seaports, to Government Offices and public institutions, to correspondents of the Office, and to foreign meteorological institutions. The issue to subscribers has amounted to about 170 copies, and in the course of the past year the Council have made provisional arrangements for the sale of single copies of the Daily Weather Report at a penny each, from about 3 o'clock of the afternoon of the day of issue, at the Meteorological Office and at the railway bookstalls of the following terminal railway stations in London: Victoria (S. E. & C. and L. B. & S. C.), Charing Cross, St. Pancras, King's Cross and Euston. It is hoped that the facilities afforded by the new arrangement may bring the information which the reports contain within the reach of some of those interested in the subject who live outside the present limits of delivery on the day of issue. If the provisional arrangement should make it apparent that there is any public demand for the accommodation, efforts will be made to continue and extend it.

Display of information in front of the Office.

Display at the Meteorological Office in London of Information as to the Weather on British Coasts.—At 9.30 a.m. and 3 p.m. every week day the substance of the reports received by telegraph, as to

the state of the weather and of the sea at the following stations: Yarmouth, Dover (Dungeness), Portland Bill, Scilly, Holyhead, and Valencia Island, is conspicuously displayed on the balcony of the Office, at 63, Victoria Street, S.W. At the same hours charts are suspended in the portico of the street door, which exhibit the latest information from all our coasts, and the latest forecasts and storm warnings that have been issued.

Weather Forecasts.

Weather Forecasts.—In addition to their publication in the Daily Weather Report various means are adopted for the distribution of the forecasts drawn up in the Office of which the following is a summary for the past year.

11 *a.m. Forecasts.*—These forecasts are based upon the 8 a.m. observations, and are drawn up at 11 a.m. for the 24 hours ending at noon on the following day. Copies are called for by messengers from newspapers or news agencies, and printed copies are delivered to subscribers and distributed for exhibition as follows: in the City, at the Mansion House, Lloyd's Rooms, Messrs. R. & J. Beck's, Cornhill, and Messrs. de la Rue & Co.'s, Bunhill Row; in the West End, in the Libraries of the House of Lords and the House of Commons; at Messrs. Elliott's, St. Martin's Lane; Messrs. Stanford's, Charing Cross; Messrs. Negretti & Zambra's, Regent Street; and at the Office, 63, Victoria Street.

At the request of the Admiralty forecasts for the S.W. of England and the Bay of Biscay are regularly supplied to the Commander-in-Chief, Devonport, and other forecasts for separate districts are sent by telegraph to certain provincial newspapers.

3.30 *p.m. Harvest Forecasts.*—During the summer months (June to September inclusive) a special service of forecasts is arranged for the benefit of agriculturists and others. The forecasts are based upon special telegraphic reports of observations taken at 2 p.m. at a selected number of Reporting Stations, and refer to the 24 hours from midnight of the day of issue. The forecasts are sent by telegraph to those who express a wish to receive them regularly, and who defray the cost of the telegrams. The number of recipients of these forecasts for various periods in the summer of 1900 was 129. It showed a remarkable increase over the number of applications in 1899, which only reached 20.

8 *p.m. Forecasts.*—These are based upon the 6 p.m. observations and are distributed with the evening report to the representatives of newspapers and news agencies for insertion in the morning papers. The number of copies so distributed has not been materially changed in the course of the year.

Telegraphic inquiries for forecasts.

Forecasts are also sent by the Office in reply to inquiries by post or by telegram received between the hours of 8.30 a.m. and 8 p.m. The revised arrangements referred to last year for the supply of weather information by telegraph, whereby the charge was reduced from 1*s.* to 6*d.*, in addition to the cost of the inquiry and reply telegrams, came into force on August 1st. A circular announcing the change was, through the courtesy of the Postmaster General, exhibited at the Postal Telegraph Offices. In consequence the number of telegraphic inquiries has increased in the year from 90 to 256. There were also 86 personal inquiries

for forecasts during the year, and a very large number of inquiries on the part of representatives of the press for special information upon any unusual occurrence in connexion with the weather.

Transcripts of observations.

The Council have from time to time received applications for special transcripts of a selection of the observations made for the Office. It has long been the practice to supply specially drawn maps for the "Times," and for some time past special transcripts of the observations have been furnished to the "Daily Mail," and until December, 1900, to the "Express." During the past year a similar transcript has been furnished by telegram to the "Liverpool Journal of Commerce." The Liverpool Underwriters' Association has for many years past received a daily telegram from the Office of observations at a number of coast stations. The "Daily Telegraph" has been supplied with special observations made at Valencia at 10 p.m. each night. For these services a charge has been made.

Within the past year the United States Weather Bureau has requested the Council to make arrangements for sending a daily message by cable reporting the 8 a.m. observations at a number of British and European stations. Arrangements have been made accordingly and have been in operation since December 18th, 1900.

Results of Forecasts.

A comparison for the year of the Forecasts for the United Kingdom issued at 8.30 p.m., with the subsequent weather actually experienced, is given in detail in Appendix VII., p. 80. The complete success, partial success, partial failure, and complete failure of the forecast is estimated according to definite rules which are designed to eliminate bias as far as possible.

It will here suffice to state that partial success means that the Forecast was correct for more than half the elements dealt with at the places of observation situated in the district in question, and a similar interpretation is to be applied to the term partial in the case of the failures.

The detailed comparison of the Forecasts with actuality may be summarised as follows :—

SUMMARY of RESULTS of 8.30 p.m. FORECASTS, 1900–1901.

Districts.	Per-centages.				
	Complete Success.	Partial Success.	Partial Failure.	Complete Failure.	Sum of Successes, Complete and Partial.
SCOTLAND, N. ...	58	26	11	5	84
„ E. ...	56	27	12	5	83
ENGLAND, N.E. ...	60	28	10	2	88
„ E.	56	28	13	3	84
MIDLAND COUNTIES...	58	27	12	3	85
ENGLAND, S.	58	30	10	2	88
SCOTLAND, W. ...	59	25	10	6	84
ENGLAND, N.W. ...	55	28	12	5	83
„ S.W. ...	57	29	10	4	86
IRELAND, N.	56	27	11	6	83
„ S.	55	25	13	7	80
Summary ...	57	27	11	5	84

In order to test the success of the Forecasts of the year in comparison with those of previous ones, the following table has been drawn up. It shows for each year of the decade 1891–1900 the per-centages of complete and partial success of the Forecast issued at 8.30 p.m. It will be noticed that the highest degree of complete success was obtained in 1893 and 1900, and that the number of complete successes was above the average for the whole decade.

PER-CENTAGES of SUCCESS in the FORECASTS for the whole of the BRITISH ISLES.

Year.	Complete Success.	Partial Success.	Sum of Successes, Complete and Partial.
1891	50	30	80
1892	46	33	79
1893	59	25	84
1894	56	27	83
1895	55	25	80
1896	54	27	81
1897	55	26	81
1898	55	28	83
1899	55	27	82
1900	57	27	84
Average	54·2	27·5	81·7

The forecasts for the N.W. district of England issued during six weeks of the current year have been independently checked by Mr. T. G. Benn of Newton Reigny, who brought out a much larger percentage of successes (total and partial) than that shown by the checking made in the Office.

Storm Warnings.

Storm Warnings for the Coasts of the United Kingdom.— Warnings of coming storms are dispatched by telegraph to certain stations on the coast. These stations are supplied with signals which are hoisted as warnings to mariners of expected storms. The signals are defined in Circular 717 of the Board of Trade, issued in February, 1874.

A list of the stations is given in Appendix II., p. 45. At the end of March, 1900, there were 233, of which 124 were in England and Wales, 70 in Scotland, 32 in Ireland, 4 in the Isle of Man, and 3 in the Channel Islands.

The Council regret that very few of the stations have any provision for exhibiting warning signals after dark, so that a telegram sent in the winter months on account of observations received in the afternoon or evening remains in many cases unheeded until after daylight on the following morning. This unsatisfactory state of things arises from the fact that the Council are only able to supply the signal cone. The provision of accessories and of the lamps and oil necessary for signalling at night is left to the locality.

A comparison has been made in the Office between the warnings issued during the year and the subsequent weather actually

experienced, in accordance with the method indicated in the Report for 1888–9, Appendix VII., p. 64.

The Council have again to acknowledge their obligations to Trinity House, the Irish Lights Office, the Scottish Meteorological Society, and the Mersey Docks and Harbour Board, for the loan of the log books of Lightships and Lighthouses for the purpose of this comparison.

The results of the comparison are exhibited in the following table :—

STORM WARNING CHECKING.

COMPARISON between the WARNINGS and the subsequent WEATHER in 1900.

Coasts.	Total No. of Warnings.	Warnings justified by subsequent Gales. Force 8 and upwards.	Warnings justified by subsequent strong Winds. Forces 6 & 7.	Warnings not justified by subsequent Weather.	Warnings late. Force 6 reached at two Stations before issue.	Warnings partially late. Force 6 reached at one Station before issue.	Warnings issued in consequence of telegraphic errors.	Storms for which no Warning was issued.
Scotland, N.E. ...	46	33	10	3	—	—	—	Mar. 12.
„ E. ...	37	17	19	1	—	—	—	Apr. 15.
„ N.W. ...	44	27	14	3	—	—	—	Nov. 10.
„ W. ...	44	18	19	6	—	1	—	—
Ireland, S.W. ...	49	32	15	2	—	—	—	June 24.
„ N.W. ...	53	38	10	3	—	2	—	June 24, Nov. 8, Nov. 10, Nov. 13–14.
Irish Sea	43	38	3	1	1	—	—	Jan. 18 (part), Aug. 3. Oct. 26.
St. George's Channel	34	23	7	1	—	3	—	—
Bristol Channel ...	37	30	7	—	—	—	—	—
England, S.W. ...	36	26	7	2	—	1	—	Dec. 27.
„ S. ...	24	13	7	4	—	—	—	—
„ S.E. ...	23	15	5	3	—	—	—	—
„ E. ...	18	11	3	3	—	1	—	Feb. 14, Aug. 3, Oct. 26.
„ N.E. ...	24	18	6	—	—	—	—	Apr. 13, Apr. 15, Aug. 3, Oct. 26.
Totals ...	512	339	132	32	1	8	—	
Percentages...	—	66·2	25·8	6·3	0·2	1·5	—	

NOTES on GALES EXPERIENCED in 1900, for which no WARNING had been issued.

January 18th.—EASTERN SHORES OF IRISH SEA. A N.W. gale.

The Western shores of the sea were duly warned, but gale proved more general than was anticipated.

February 14*th.*—ENGLAND, E. An Easterly gale.

Our S. and S.E. coasts were duly warned, but gale extended further than was expected.

March 12*th.*—SCOTLAND, E. A N. to N.W. gale.

Due to a secondary depression, not indicated even at 8 a.m. on 12th. In the evening it was too late.

April 13*th.*—ENGLAND, N.E. and E. A W. gale.

All our Western coasts had been warned, but the gale extended further than was expected, owing to a secondary depression, not indicated beforehand.

April 15*th.*—SCOTLAND, E., and ENGLAND, N.E. A S.W. gale.

Similar to next above.

June 24*th.*—IRELAND, S.W. and N.W. A N.W. gale.

The appearance at 8 a.m. was not threatening, but wind proved stronger than was anticipated.

August 3*rd.*—Eastern half of IRISH SEA, ENGLAND, N.E. and E. A N. to N.E. gale.

Many coasts were warned on evening of 2nd, but the disturbance was larger than was anticipated.

October 26*th.*—IRISH SEA, ENGLAND, N.E. and E. A N.W. gale.

The depression which caused this gale originated and was developed over the N. of England on 25th–26th. The gale was accompanied by unusually heavy rains (three inches and more). The weather was certainly rainy and unsettled, but there was no indication that such a storm was probable.

November 8*th.*—IRELAND, N.W. A W. to N.W. gale.

There was no indication of the approach of this gale on the evening of the 7th, and at 8 a.m. on the 8th it was too late to warn.

November 10*th.*—SCOTLAND, N.W., and IRELAND, N.W. A W. gale.

Felt at extreme outlying stations only—due to a secondary disturbance of which no indication was given at 6 p.m. 9th.

November 13*th* and 14*th.*—SCOTLAND, N.W., and IRELAND, N.W.

This gale was felt at outlying stations only, and was accompanied by a very sudden increase of pressure over the Atlantic, in the rear of a previous shallow low-pressure system.

December 27*th.*—ENGLAND, S.W. A W. gale.

England S. and S.E. were duly warned, but the advent of this depression was very sudden, and there were no indications of its approach.

Comparison of results for 1900 with previous years.

The following table contains a statement of the amount of success of storm warnings in the decade 1891–1900 :—

Years.	Total No. of Warnings issued.	Warnings justified by subsequent Gales.	Warnings justified by subsequent strong Winds.	Total Warnings justified.	Warnings not justified by subsequent Weather.
		p.c.	p.c.	p.c.	p.c.
1891	522	62·3	24·5	86·8	7·5
1892	488	59·4	31·2	90·6	6·8
1893	480	60·8	28·6	89·4	7·1
1894	502	68·5	23·5	92·0	6·0
1895	523	63·3	26·4	89·7	8·0
1896	467	67·7	23·8	91·5	2·9
1897	596	60·1	31·7	91·8	4·5
1898	581	59·8	27·5	87·3	4·5
1899	504	59·3	31·9	91·2	4·8
1900	512	66·2	25·8	92·0	6·3

The Council have again to acknowledge the courtesy of Lloyd's in forwarding observations from a number of their signal stations.

PART III.

CLIMATOLOGY.

I.—BRITISH ISLES.

The Council do not attempt to deal completely with the details of the climatology of the British Isles, but they receive returns of various kinds from stations in all parts of the kingdom. Some of these returns are from the stations which are supported by the Office, but the greater number are furnished by volunteer observers. A complete alphabetical table of the stations which furnished returns in the year ended on March 31, 1901, is given in Appendix II., p. 56. The nature of the information supplied is indicated by the letters in the sixth column of the table, which are explained on p. 55. To facilitate reference the same letters are used in the enumeration of the different classes of stations which is given here, although the lettering is not consecutive.

Classification of Stations.

For the purposes of classification meteorological stations are, by International agreement, divided into three orders as follows :—

Stations of the First Order.

I. *Stations of the First Order* are observatories which furnish continuous records of the barometric pressure and the temperatures of the dry-bulb and wet-bulb, as well as continuous records of rainfall, wind, and bright sunshine, with frequent eye observations of the weather and of the kind and amount of cloud.

At the observatories connected with the Office the registration of the barometer and the wet-bulb and dry-bulb thermometers is photographic, according to the system established by the Meteorological Committee in 1868. The wind registration is by

the Kew pattern Robinson anemograph, with 9-in. cups and 2-ft. arms. The rain records are by Beckley's float rain gauge, and the records of sunshine by the Campbell-Stokes sunshine recorder.

In addition to the observatories which are completely equipped, self-recording instruments of various kinds have been installed at other stations, and their records are forwarded to the Office. The whole number of stations provided with self-recording instruments may accordingly be subdivided as follows :—

A. *Fully equipped Observatories.*

B. *Anemograph Stations*, at which continuous records of wind are obtained.

C. *Barograph Stations*, which supply records of pressure derived from self-recording aneroid barometers.

S. *Sunshine Stations.*

Stations of the Second Order.

II. *Stations of the Second Order.*—This name is limited to stations which supply normal climatological data—viz., observations of pressure, of the dry-bulb and wet-bulb thermometers, the direction and force of the wind, the amount and kind of cloud, and the state of the weather taken twice daily at properly correlated hours; together with measurements of rainfall, maximum and minimum temperature, taken once daily at the appropriate hours. The selected hours of observation for the British Isles are 9 a.m. and 9 p.m. *local time*, and stations at which the observations comply in all respects with this specification may be called Normal Climatological Stations. They are indicated in the table of Appendix II. by the letter D.

At many of the stations of the Second Order in this country sunshine records are added, but though eminently desirable they are not included in the International specification.

Observations of "grass minimum" and "solar maximum" thermometers are sometimes added to the returns of normal stations.

Stations of the Third Order.

III. *Stations of the Third Order.*—All other stations which furnish climatological data not so complete as those of normal stations, or data derived from observations at other than the normal hours, are classed as Third Order Stations. This class technically includes the Telegraphic Reporting Stations, because the hours of observation at these stations are 8 a.m. and 6 p.m. *Greenwich time*, instead of 9 a.m. and 9 p.m. *local time*; and there is a difference of practice as regards the time of reading the maximum and minimum thermometers, although the instruments used are the same, and the amount of information is quite as full as that from normal stations. The stations included in this class may be subdivided into the following groups :—

T. *Telegraphic Reporting Stations*, giving observations at 8 a.m. and 6 p.m. (Greenwich mean time); some also at 2 p.m.

G. Other *Climatological Stations*, with the same equipment as a normal station, but giving readings once a day only, or at hours differing from 9 a.m. or 9 p.m.

F. *Weekly Weather Report Stations*, supplying weekly returns of observations of rainfall and of the maxima and minima of temperature taken at 9 a.m. daily.

R. *Rainfall Stations*, which supply monthly returns of daily observations of rainfall, with remarks on the weather.

Sea temperature stations.

IV. *Sea Temperature Stations* (*W.*), at which observations of the temperature of the sea and of the air are taken twice daily.

First order stations.

Observatories.

A. STATIONS OF THE FIRST ORDER: OBSERVATORIES.—The Council has continued to maintain the observatory at Valencia (Cahirciveen), and has also continued its contributions to the maintenance of the meteorological observatories at Kew, Falmouth, Aberdeen, and Fort William,* at which the self-recording instruments, installed by the Council, are under the management of the National Physical Laboratory, the Royal Cornwall Polytechnic Society, the University of Aberdeen, and the Scottish Meteorological Society respectively. From the observatories complete records of the meteorological elements, together with the appropriate tabulations and eye observations, have been, with one exception, regularly received. The returns from Fort William have fallen into arrear owing to the indisposition of the staff, but the arrears are (May, 1901) being rapidly made up. The arrangement with the observatories at Glasgow and Stonyhurst, under which copies of the traces of the self-recording instruments are supplied to the Office, have been likewise continued.

The Council has also made a contribution to the Scottish Meteorological Society towards the cost of the hourly observations at the summit of Ben Nevis.

Ben Nevis observatories.

No change has been made in any of the arrangements for the first order stations during the year. Three years ago the Council were informed (*see* Report 1899, p. 22) that the observatories at Ben Nevis would be discontinued for lack of funds, and accordingly they gave the notice agreed upon to terminate the arrangement under which they made a grant towards the maintenance of these observatories. The notice expires in October, 1901. The Scottish Meteorological Society, however, through private benefactions, have found themselves enabled to continue the observatories, and have requested the Council to continue the grants for another year. The matter is still (June, 1901) under the consideration of the Council.

As already mentioned, the letters in column 6 of the table in Appendix II. indicate the nature of the information received by the Office from the several stations. In many cases more elaborate observations are taken, although they are not reported to the Office. For example, the Radcliffe Observatory at Oxford and the Observatory of the Mersey Docks and Harbour Board at Bidston are fully equipped observatories of the First Order. The

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* The observatory at Fort William has no Anemograph, the site being unsuitable for satisfactory observations of wind.

Fernley Observatory of the Corporation of Southport, the Gillibrand Observatory of the Corporation of Darwen, the Observatory of the Birmingham and Midland Institute at Edgbaston, the Observatory of the late Sir Cuthbert Peek, Bart., at Rousdon, and the Meteorological establishments at St. Helen's and at Plymouth, possess many valuable self-recording instruments.

Anemographic stations.

B. ANEMOGRAPHIC STATIONS.—In the autumn of last year the Council learned that the Robinson Anemometer on Kingstown Pier, belonging to the Irish Board of Works, was still maintained in operation. They accordingly applied to the Board of Works for copies of the records. The Board very courteously agreed to send the original sheets, and from the beginning of the present year the records have been received monthly. The records for the past twenty-one years have also been sent to the Office, and are preserved with those from 1856 to 1879 for the same station which had previously been received. In other respects the Anemographic stations remain unchanged. Anemometers are still maintained by the Office (in addition to those at the stations of the first order) at Armagh,* Deerness (Orkney), Fleetwood, Holyhead, Shields, Yarmouth, and Scilly. At Phœnix Park, Dublin, the Council's Anemometer is in charge of the staff of the Ordnance Survey, who send up the records; and the Council also receive the records from the Duke of Northumberland's Anemometer at Alnwick. The Anemometers are of the standard Robinson pattern, except at Scilly and Phœnix Park, where they are of smaller size. At Kew, Holyhead, and Scilly Dines' pressure tube instruments are also maintained for the purpose of comparison, and at Holyhead a pressure plate instrument and a bridled Robinson Anemometer are kept at work for experimental purposes.

Barographic stations.

C. BAROGRAPHIC STATIONS.—A number of the Telegraphic Stations are supplied by the Council with self-recording aneroid barometers for use in reporting, and in addition the Council receive every week the traces from a number of barographs belonging to private observers. During the past year these have been increased by barograms from Chatsworth, which have been forwarded by the Duke of Devonshire, who sends also weekly thermograph curves. The other stations from which barograms have been received are Fulbeck (Rev. V. F. Willson); Kilkenny (the Marquis of Ormonde); the Athenæum Club; Penbedw (Mr. H. W. Buddicom); Waterford (the Harbour Authorities); Forgandenny, Perth (Mr. C. L. Wood); Hampstead (Mr. H. R. Beeton); Rochford, Tenbury (Rev. J. Tomson.)

Sunshine stations.

S. SUNSHINE STATIONS.—Complete returns of the original cards for the year have been received from 58 stations. The returns from Edinburgh, Bournemouth and York were discontinued in the course of the year, the two latter stations temporarily, and returns from Kingstown (Dr. Power) were commenced; a second Station was also established at Sheffield by the Corporation for the purpose of ascertaining the local variation in the amount

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* The observatory at Armagh is also provided with a Beckley's self-recording rain gauge, the records of which are regularly sent to the Office.

of bright sunshine, and the returns from Scarborough, which had been discontinued since October, 1899, have been recommenced.

In addition to these records, which are all from instruments of the Campbell-Stokes design, tabulations of the daily amount of sunshine have been received from 14 other stations for insertion in the Weekly Weather Report. Of these, six were derived from the records of the Jordan recorder, which depends upon the exposure of sensitive paper to the sun's light, and the others from Campbell-Stokes' instruments.

The distribution of the Sunshine Stations on the 31st March was as follows :—

SUNSHINE STATIONS (82) AT MARCH 31, 1901.

Stations.	No.	Stations.	No.
Scotland, N.	6	England, N.E.	6
„ E.	4	„ N.W. and N. Wales	13
„ W.	2	„ Midland Counties	8
Ireland, N.	2	„ E.	9
„ S.	4	„ S.	16
Channel Islands	3	„ S.W. and S. Wales	9

Additional stations desired.

The Council would welcome additional observations, especially from Scotland and Ireland and the inland parts of Wales and of the south-west of England.

For the purpose of uniformity in the returns, they deem it desirable that the observations should be made with the Campbell-Stokes instrument, and they are in consultation with the National Physical Laboratory with a view to drawing up a standard specification of the instrument that shall lead to strict comparability of the records.

D. *Stations of the Second Order.*—These stations, as well as many of the sunshine stations, and all the stations enumerated under F, G, and R, are maintained by private persons or local authorities or institutions, who provide their own outfit of instruments. Returns for 1900 were received from 80 stations. The returns are of two kinds : first, detailed daily records of pressure, temperature and other data on a Form which is known as the International Form A ; and secondly, monthly summaries of the daily observations for the year on the International Form B. All the observers, numbering 45, who send their reports directly to the Office make their returns monthly on the first Form. In addition to these returns the Council have arranged with the Royal Meteorological Society and the Scottish Meteorological Society to forward to the Office returns already prepared for publication, some on Form A and others on Form B. These are incorporated with the returns which are received directly and prepared for publication in the Office. The returns which have been forwarded to the Office under this arrangement are 4 on Form A and 12 on Form B from the Royal Meteoro-

logical Society, and 3 on Form A and 16 on Form B from the Scottish Meteorological Society. The stations from which they have been received are marked M. and S. respectively in the list of stations in Appendix II.

The stations of the Second Order for 1900 were distributed as follows :—

Stations.	No.	Stations.	No.
Scotland, N.	7	England, N.E.	10
„ E.	8	„ N.W., and N. Wales	8
„ W.	9	„ Midland Counties	12
Ireland, N.	4	„ E.	6
„ S.	5	„ S.	6
Channel Islands	0	„ S.W., and S. Wales	5

The Council have to regret the discontinuance during the year of the return of observations from the following stations : Chester (the Rev. J. C. Mitchell, B.D.), Currygrane, Edgeworthstown, Co. Longford (Mr. J. M. Wilson, M.A.), Edinburgh (Mr. R. C. Mossman, F.R.S.E.), Ladylaw (Mr. T. Wilson), Londonderry (Mr. J. Conroy), Rochester (Mr. W. H. Tingey, B.A.), and Tenby (Mr. R. J. Truscott for the Corporation). Mr. J. Conroy has been a valued correspondent of the Office for very many years, and though unable on account of advancing age to carry on the observations twice daily, he still contributes a return of daily observations for the Weekly Weather Report. The Tenby Corporation still supply sunshine records for the same publication.

On the other hand the Council are glad to report that normal returns of observations have been commenced from the Owens College Observatory, Whitworth Park, Manchester, which is in the charge of Professor A. Schuster, F.R.S.; and from the Gillibrand Observatory of the Darwen Corporation, which is in the charge of Mr. G. Mainland; and also that Mr. J. Smith Hill, B.A., Principal of the Agricultural College at Aspatria, near Carlisle, has established a normal station at that College, from which returns have been received since February.

T. *Telegraphic Reporting Stations.*—These have been already referred to in Part II. The observations from these stations for each month are repeated at the end of the month on a special form of return, from which the telegraphic reports can be corrected, if necessary, before being used for statistical purposes.

G. *Other Climatological Stations.*—A return of daily observations at 9 a.m. at Machrihanish by Mr. J. Franklin Adams commenced from April, 1900, and a similar return from a station in the People's Park at Kingstown has been set on foot by Dr. J. B. Power, the Medical Officer of Health.

The Council, however, regret that the excellent returns from Cooper's Hill of observations at 9 a.m. and 3 p.m., which have been forwarded for many years by Professor H. McLeod, F.R.S., were discontinued at the close of the year.

F. *Weekly Weather Report Stations.*—Weekly returns for the Weekly Weather Report (*see* p. 33) are received from several Normal Climatological Stations as the letters in Column 6 of the Table of Stations will show. By the arrangement which has already been referred to the returns for 10 stations are forwarded weekly by the Royal Meteorological Society, and for 7 by the Scottish Meteorological Society.

A number of changes have taken place in the stations belonging to this group in the course of the year. Observations at Colley Weston by Miss Tasker replace those at Ketton Hall, which were supplied by the late Mr. Fred Coventry. Those at Swarraton (by Rev. W. L. W. Eyre, M.A.) are forwarded by the Royal Meteorological Society in place of observations previously received through the Society from Cranley, in the same district. Archdeacon Wynne, of Killarney, who has found himself obliged to discontinue his observations, has transferred his instruments to Dr. E. W. Griffin, the Medical Officer of the District Lunatic Asylum, and thus the returns from that station are continued with but little change of position, and with the intermission of only a few weeks. The Rev. V. F. Willson, who has maintained for some years a normal station at Fulbeck (Lincolnshire), is now sending a weekly return as well, and Messrs. John Summers & Sons have commenced a weekly return from Hawarden Bridge, Chester.

The telegraphic reports from Bath (*see* p. 9) furnish an additional set of returns for the weekly report.

R. *Rainfall Stations.*—There have also been a considerable number of changes in these stations. Returns from Burford, Dolmelynllyn, Market Rasen, Barvin, Tixover Hall, and Quin have ceased, and others have been commenced at Hastings (St. Helen's Crescent), Mareham le Fen, New Church (Mon.), Newton Hall, and Rauceby (Lincolnshire); while Mr. G. E. Elland's observations, which formerly came from Wealdstone, are now made for Watford.

Sea Temperature Stations.

W. *Sea Temperature Stations.*—Daily observations of the temperature of the sea-surface have been taken since 1879 at a number of stations. The observations for the three years 1879–1882 were used in the preparation of the "Meteorological Atlas," published in 1883.

The stations from which returns were received during the past year comprised 16 English and 3 Irish Light Vessels, 4 Coastguard Stations in England, 12 in Scotland, and 12 in Ireland, together with stations at Holyhead, St. Ann's Head, and Scilly. Twelve of these stations are situated on the Atlantic seaboard, 10 in the Irish Sea and North Channel, 2 in St. George's Channel, 3 in the Bristol Channel, 7 in the English Channel, and 16 in the North Sea.

Inspection of Stations.

Inspection of the Stations.—In order to secure uniformity of method and to guard against instrumental errors, the stations classified under the heads A, B, C, D, S, and T are regularly inspected, while the others are visited as opportunity offers. The stations of Class II., which belong to the Royal Meteorological Society, are visited by an Inspector appointed by

that Society. In accordance with the recommendation of the Treasury Committee (1877), a contribution towards the cost of this inspection is made by the Office. The rest of the stations are visited from time to time by the Inspectors of the Office. During the past year Dr. Buchan visited the Scottish Stations, Mr. W. N. Shaw, Secretary, took charge of the inspection of the stations in Ireland and the North West of England, and North Wales. The other parts of England and Wales were visited by Mr. F. Gaster, Mr. R. H. Curtis, Mr. J. A. Curtis and Mr. F. J. Brodie. The inspection of the principal observatories and of some of the anemographic stations was carried out by Messrs. T. W. Baker and E. G. Constable, of Kew Observatory. In the list of stations given in Appendix II., p. 56, the year when each station was last visited by an Inspector from the Office, is indicated by the figures in the seventh column.

Extracts from the reports of the Inspectors upon the self-recording instruments are given in Appendix IX., p. 89. A report on the instruments maintained by the Council at the Kew Observatory, in the charge of the National Physical Laboratory, is also given, together with some notes on the work of the Ben Nevis Observatories, forwarded by Sir A. Mitchell in reply to a request from the Council.

The whole list of stations sending returns to the Office during the year 1900-1901 may be summarised as follows :—

Number and Description.	Class.	Nature of the Information received. (*See* p. 55).
8 Observatories	I.	A.
16 Anemograph stations	—	B.
17 Barograph stations	—	C.
82 Sunshine stations	—	S.
80 Second Order stations...	II.	D.
28 Telegraphic stations	III.	T.
Weekly Weather Report stations	III.	F.
102 Climatological stations	III.	G.
Rainfall stations	III.	R.
50 Sea Temperature stations	—	W.

Use of the information from climatological stations.

The information collected from the stations is carefully arranged and kept ready for reference. The returns required for the current publications of the Office referred to in Part VI., p. 33, are examined, checked and prepared for the press ; the information is also utilised in other ways.

Reports supplied to Registrar-General for Ireland.

Weekly results of the Temperature and Rainfall Observations are prepared and regularly supplied to the Registrar-General for Ireland from 10 of the Irish stations for use in his "Weekly Return of Births and Deaths," while a full table of Monthly and Quarterly results from seven stations is prepared in the Office, and supplied to him at the beginning of each quarter for publication in his "Quarterly Return of Marriages, Births, and Deaths."

Rainfall observations. Copies of observations at twenty-four Rainfall Stations have also been sent for the use of the British Rainfall Organisation to Dr. H. R. Mill and Mr. Sowerby Wallis, who have succeeded the late Mr. G. J. Symons in the management of that Organisation.

Ben Nevis observations. A transcript of Ben Nevis observations has been sent to Dr. Hergesell at his request in connexion with the International Aeronautical Investigation.

Miscellaneous inquiries. The information is also used to furnish replies to inquiries. During the year upwards of sixty requests for statistical information of more or less extensive character have been dealt with. Some of these have been required for use in scientific inquiries, but the greater number have been from firms of Solicitors and have reference to disputed claims for damages and other legal actions and ask principally for statistics of winds and fogs.

Among the inquiries of the former kind which have been dealt with during the past year may be mentioned the following :—

From the Royal Commission on Salmon Fisheries and from Dr. D. Noel Paton as to the Rainfall over England and Wales in the 10 years 1881–1890 ;

From the Irish Department of Agriculture as to ground frosts reported at Irish Stations in the ten years from 1890 for use in an inquiry concerning flax cultivation ;

From the Marine Biological Association, Plymouth (through Mr. Walter Garstang), as to the mean monthly temperatures of the sea to the West of the British Isles, and as to the average temperature of the British Isles for each quarter from 1854.

II.—Foreign and Colonial Stations.

A list of documents received from Foreign and Colonial Stations in the course of the year is given in Appendix II., p. 65.

Of these stations, one, St. Helena, has an anemograph in addition to the usual climatological instruments. Six are in Cyprus and have been in operation since 1882. Six are in the Bahamas, of which five send in lighthouse registers. Three are in the West Indies. Ten are on the West Coast of Africa. Three are on the Mediterranean Coast. Two are in Central or South America. One in the Falkland Islands, one at Teneriffe, and one in Madagascar.

The returns from distant stations have been largely used for the compilation of meteorological information for the Admiralty. (*See* p. 13).

Uganda observations. Observations chiefly relating to the Lake Levels and Rainfall of several stations on the Victoria Nyanza have been received from the Foreign Office and copies will be supplied to the Royal Geographical Society and Mr. E. Ravenstein for publication.

PART IV.

LIBRARY.

The main part of the Library consists of the weather maps and other publications of the Weather Offices of different countries, and meteorological reports and publications received from all quarters of the globe. Most of these are presented or obtained by way of exchange, but a few standard works and serial publications are purchased. Each work, immediately on receipt, is entered on a card under the author's name, and is subsequently entered in a classified catalogue under the subject to which it refers. The Library consists at present of about 16,000 volumes and pamphlets.

Appendix XI., p. 117, gives a list of the additions to the Library during the year. These amounted to 450 books and pamphlets.

The series of daily weather maps, which already included weather charts for Japan in the far East, for the United States and for Mexico in the Western and for New South Wales in the Southern Hemisphere, has been amplified by the receipt of charts from the Meteorological Services of Canada, Saxony, Denmark and Holland. The most important additions to the library acquired by purchase have been the daily synoptic charts of the North Atlantic and adjacent countries, for the year from December 1894 to November 1895, prepared by the German and Danish Meteorological Authorities jointly, and three important volumes giving an account of Scientific Balloon Voyages from Berlin prepared by Dr. Assmann and Dr. Berson for the Berlin Aeronautical Society.

Among the presents to the Library is included a magnificent Climatological Atlas of the Russian Empire, the publication of which constitutes the memorial of the 50th anniversary of the opening of Nicholas Central Physical Observatory at St. Petersburg. A History of the Observatory accompanied the Atlas. A Climatological Album of Roumania has also been received from Professor S. C. Hepites.

The Library is available for the use of students and others between the hours of 10 a.m. and 4 p.m. A number of persons have availed themselves of this accommodation, and in particular Mr. F. W. Harmer, for meteorological information in connexion with a paper on the Meteorology of the glacial epochs for the Geological Society, and Sir Norman Lockyer, K.C.B., in connexion with his researches upon the periodicity of rainfall in Equatorial and Southern latitudes.

PART V.

MISCELLANEOUS INVESTIGATIONS.

Atmospheric Electricity.

Atmospheric Electricity.—In continuation of the inquiry into the records of the Electrograph at Kew, Mr. C. T. R. Wilson, F.R.S., has contributed to the Royal Society a paper on the "Ionization of Atmospheric Air" which has been published in the Proceedings of

the Society (Proc. Roy. Soc., Vol. 68, p. 151). This paper concludes the inquiry for the present. Mr. Wilson summarises the results of the investigation in a report sent to the Council at the end of January, which is printed in Appendix X., p. 114.

Seasonal variation of temperature.

With the assistance of Mr. R. Waley Cohen, B.A., the Secretary has initiated an inquiry into the seasonal variation of the temperature of the air of the British Isles, as shown by the daily means for 25 years, computed in the Office from the hourly readings of temperature at four of the Observatories connected with the Office. The inquiry is directed towards tracing the connexion between certain peculiarities disclosed by the harmonic analysis of the curves of seasonal variation of temperature and the occurrence of winds from different points of the compass and the temperatures associated therewith. The results will be embodied in a paper in due course.

Atlantic weather, 1898–9.

The investigation of the circumstances associated with the exceptional winter weather of 1898–99, an account of which appeared as an introduction to the publication of daily Charts illustrating that period, proved to be of considerable interest and importance. It was accordingly thought desirable that Captain Campbell Hepworth, Marine Superintendent, who drew up the introduction, should read a paper on the subject before the British Association at Bradford. An abstract of the paper appears in the Report of the Association.

Miscellaneous.

Mr. R. H. Curtis, who has charge of the sunshine records sent to the Office, and has given a great amount of attention to the subject, read a paper on an improved sunshine recorder before the Royal Meteorological Society. The recorders sent out from the Office since the introduction of this improvement have been arranged in the manner described in that paper.

The comparison of anemometers at Holyhead has been continued.

The reduction and tabulation for the Royal Society of the observations of the "Southern Cross" Antarctic Expedition have already been referred to, as likewise the preparation of data books from the logs of ships south of latitude 40° S. for the use of the Antarctic Expedition.

The Council have thought it desirable to draw up a brief statement of the conspicuous features of the weather during the year 1900 for the purposes of future reference, and this is printed in Appendix VIII.

Among the incidents is included the thunderstorm which broke over London in the afternoon of July 27. This storm moved northward from the Bay of Biscay, contrary to the anticipation of the Office, and in consequence the Official forecast failed, and attention was called to the fact by a letter in the *Times*. A diagram has been prepared showing all the continuous records that could be collected from various self-recording instruments, and the diagram is reproduced on p. 86.

International co-operation for Balloon Researches.

In connexion with the balloon ascents, arranged by international agreement, Prof. Hergesell, of Strassburg, Chairman of the International Sub-Committee for Aeronautics, requested the co-operation

of the Council in the collection of cloud observations for the day preceding and the day following, as well as for the day of each ascent. The following observatories expressed their willingness to co-operate in this matter: Greenwich, Kew, Oxford, Glasgow, Rousdon, Valencia, Falmouth, Liverpool, Stonyhurst and Aberdeen. They forward to the Office observations of clouds for the three appropriate days of each month, for transmission to Prof. Hergesell, who undertakes the necessary arrangements for collating the results.

The Council have given permission to Mr. F. J. Brodie to use unpublished data belonging to the Office for the compilation of a paper on the Gales of the British Islands, for presentation to the Royal Meteorological Society.

PART VI.

PUBLICATIONS.

Daily Weather Report.

The Daily Weather Report, embodying the reports obtained from the Telegraphic Reporting Stations and some additional information, as indicated on pp. 9 and 15, has been regularly issued.

The number of subscribers has been about 170.

Supplements shewing the mean monthly values for 25 years of the several elements at the Reporting Stations have been issued, and the means for thirty years have been prepared. The latter for the first six months of the year have been issued.

Applications for free copies of this and other publications from the University of Birmingham and from the Edinburgh Museum of Science and Art have been granted

Weekly Weather Report.

The Weekly Weather Report is based upon the observations furnished by the Telegraphic Reporting Stations, supplemented by those from a number of Third Order Stations, which are classified under the heading F of p. 55, and it includes, also, others from a number of additional Sunshine Stations. It is issued every Thursday, and gives a summary of the weather, in the week ending on the previous Saturday, for agricultural and sanitary purposes. Statistics as to the mean temperature, rainfall and sunshine for the week are given, and these are compared with the average values for a number of years. Statistics of "accumulated temperature" are also given. A brief explanation of the mode of compilation of these statistics is given in Appendix II, p. 48.

Each week's report contains, also, three weather maps, and a weather summary, which enable the reader to follow the changes of weather over the whole of Europe for each day, and its relation to barometric changes. The weekly reports have been regularly issued.

Monthly, Quarterly, and Annual Supplements.

The Monthly Supplements have also been continued in the same form as hitherto, and contain monthly summaries in a form similar to the monthly summaries for Stations of the Second Order, together with charts of the distribution of pressure and wind, temperature, rainfall, and the paths of cyclonic depressions.

Quinquennial Supplement.

The usual annual and quarterly summaries (*see* p. 49) have been issued and the quinquennial statistical summaries have been prepared and issued as supplements to the Volume for 1900.

First Order Stations.

Observatories of the First Order.—After careful examination of the curves traced by the instruments, and of the measurements of the curves made at the observatories, the readings for each hour are tabulated, and from them a volume is prepared giving the means of the readings for the several hours, of barometric pressure, temperature, wind, rainfall, and sunshine, for each consecutive group of five days, for the months, and for the year.

The form adopted for the presentation of these observations has been varied from time to time. For some years the curves themselves were reproduced. From 1874 to 1886 the hourly readings at the several observatories were published; but from 1887 the plan now in use, of giving the five-day means, was adopted, while in the volume for 1895, at the suggestion of the International Conference at Paris, the hourly readings at Kew and Valencia were included in addition, and this was continued in the volume for 1897 prepared in the current year.

Means of the meteorological elements for each hour of the day over a long period of years are also occasionally prepared; and the harmonic components are calculated for the curve representing the diurnal variation of pressure and temperature for the hourly means thus obtained for the several months over which the observations extend.

Second Order Stations.

Second Order Stations.—The returns from all the Second Order Stations are arranged to give monthly means of pressure and temperature at 9 a.m. and 9 p.m., with the means of maximum and minimum temperature for the month, as well as data concerning rainfall, the direction and force of the wind, &c. These are arranged in a Form "B," adopted for International use by the Meteorological Congress at Rome in 1879; while for certain selected stations the details of the actual observations made at 9 a.m. and 9 p.m. are set out *in extenso* in a Form "A," adopted in a similar manner. These returns are prepared with a view to the publication of an annual volume, which is entitled "*Observations at Stations of the Second Order*," of which twenty-three volumes have been issued, the last being that for 1897.

The volume for 1897 is, as regards the "A" list, the same as that for 1896, but from the "B" list two stations disappear, namely, Arley Cottage, Co. Cavan, and Killarney, while five stations are added, namely, Lairg, Sutherlandshire, Manchester (City), Edgbaston, Lowestoft, and Rede Court, Rochester, a net addition therefore of three stations.

Pilot Charts.

Publications on Marine Meteorology.—The issue of Monthly Pilot Charts for the North Atlantic and Mediterranean (*see* p. 13) commenced with the issue, shortly after the middle of March, of the number for April.

Winter of 1898-9.

Occasional Publications.—The charts illustrating the weather in the North Atlantic in the winter of 1898–9, with an introduction describing the meteorological conditions on the Eastern and Western shores of the ocean during the period, were published in March, 1901.

A complete list of the publications which have been issued by the Office is given in Appendix XIV., p. 148, and in Appendix XIII., p. 142, is given a list of important contributions to meteorology, which have not been issued as separate publications, but have been included in various Reports issued by the Office since 1866.

Report of International Committee.

In the autumn the Council issued the English version of the *Report of Proceedings of the St. Petersburg Meeting of the International Committee* in 1899. The most conspicuous feature of the publication is a long report by M. Violle upon the measurement of solar radiation; meteorological work with kites and balloons receives its share of attention, and nearly all subjects of recent meteorological investigation are touched upon

PART VII.

FINANCE.

Appendix XII., p. 141, shows the receipts and payments during the year ending 31st March 1901. The amount voted by Parliament was 15,300*l.*, as in the previous year, and the miscellaneous receipts amounted to £1,277 5*s.* 2*d.* In addition to these amounts the sum of £80 was received from the Government Grant Committee for the continuation of Mr. Wilson's researches on atmospheric electricity.

The following abstract of expenditure shows the true net charge against the Parliamentary grants of this and the preceding year, together with the increase or decrease in 1900–1, as compared with the previous year :—

NET EXPENDITURE.	1899–1900.	1900–1.	Increase.	Decrease.
GENERAL ADMINISTRATION:	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Payment of Council and Secretary	1,721 7 2	1,545 11 0	—	175 16 2
Office	909 13 6	912 9 0	2 15 6	—
Rent, Fuel, and Lighting	726 11 7	736 5 2	9 13 7	—
Alterations to premises and contingencies ...	262 14 0	331 16 1	69 2 1	—
Expenses incidental to International Meteorological Congress ...	3 5 0	26 5 11	23 0 11	—
SPECIAL RESEARCHES ...	900 5 4	803 14 3	—	96 11 1
LAND METEOROLOGY ...	3,298 4 8	3,399 7 4	101 2 8	—
WEATHER INFORMATION ...	3,477 12 10	3,488 10 7	10 17 9	—
INSPECTIONS	434 11 4	401 10 2	—	33 1 2
OCEAN METEOROLOGY ...	2,276 4 3	1,916 19 10	—	359 4 5
SUPERANNUATION	177 6 8	2,082 0 0	1,904 13 4	—
Total ... ... £	14,187 16 4	15,644 9 4	2,121 5 10	664 12 10

NOTES.—The increase under "Superannuation" is due to the retirement of the late Secretary and the purchase of an annuity on the life of a retiring clerk. The sum of £1,599 17*s.* 11*d.* was paid to the Post Office during the year 1900-1 on account of inland and foreign telegrams, allowances to telegraph clerks, rental of private wires, &c.

R. STRACHEY,
Chairman.

APPENDIX.

APPENDIX I.

CONSTITUTION OF COUNCIL.

From the ROYAL SOCIETY to the METEOROLOGICAL COUNCIL.

The Royal Society,
Burlington House, W.,
February 19th, 1900.

DEAR SIR RICHARD,

WE are directed by the President and Council of the Royal Society to inform you that your letter of February 14th has been considered by them.

The President and Council note that you state that the additional member of the Meteorological Council is required only to complete the legal number of members of the Corporation, and that an addition to their number is not desired for other reasons by the members of the Meteorological Council. Further, the President and Council are informed that the legal obligation to appoint a seventh member of the Corporation is not operative for six months from the time at which the number of members falls below seven. They are, therefore, of opinion that it will be best to defer appointing the additional member until they have had an opportunity of discussing further with the Meteorological Council what is the best course to be pursued.

To attain this end it was resolved to appoint a Committee, consisting of the officers, two members to be nominated by the Meteorological Council, the Astronomer Royal, Professor Schuster, Professor J. J. Thomson, Mr. G. J. Symons, and Mr. W. N. Shaw (if not nominated by the Meteorological Council), to consider whether any changes in the constitution and duties of the Meteorological Council are desirable.

We are, therefore, to ask that the Meteorological Council will be good enough to nominate two members of the Committee at an early date, in order that the Committee may meet as soon as possible.

We are, &c.,

M. FOSTER,
ARTHUR W. RÜCKER,
Secretaries, R.S.

Lieut.-General Sir R Strachey, G.C.S.I., F.R.S.,
Chairman of the Meteorological Council.

From the ROYAL SOCIETY to the METEOROLOGICAL COUNCIL.

The Royal Society,
3rd November, 1900.

DEAR SIR,

I AM directed to forward for the information of the Meteorological Council the enclosed copy of a scheme for the reconstitution of the Meteorological Council, which has been approved by the President and Council of the Royal Society; and to say that the President and Council are prepared, upon being called upon to do so, to appoint persons to form the Meteorological Council in accordance with Section II. of the scheme under reference.

I am, &c.

ROBERT HARRISON,
Assist. Sec., Royal Society.

The Secretary to the
Meteorological Council.

I.

In place of Articles 4, 5, 6, 7, and 8 of the present Articles of Association of the Meteorological Council the following shall be substituted :—

4. *Admission of Members.*—The Association shall consist of the Meteorological Council—a body of seven or more persons, not exceeding ten in all, of whom one is the Hydrographer of the Admiralty for the time being, and the others are nominated by the President and Council of the Royal Society.

5. *Management of the Association.*—The business of the Association shall be managed by a body of Directors, of whom the Hydrographer to the Admiralty shall be one. The President and Council of the Royal Society shall from time to time appoint as many other members of the Association as they may think fit, and for such periods as they may think fit, to be such Directors.

6. *Nomination of Chairman.*—The Chairman shall be one of the Directors, and shall be appointed from time to time by the President and Council of the Royal Society.

7. *Appointment of Secretary.*—The Secretary shall be appointed from time to time by the Directors, and may be one of the Directors.

8. *Meetings, Proceedings, &c.*—A General Meeting of the Association shall be held at least once in each year, in accordance with Section 49 of the Companies Act of 1862. The Meetings of the Directors shall be held as the Directors shall appoint, and their proceedings shall be regularly recorded and printed. The Association shall submit, yearly, a Report of its Proceedings to the Royal Society for presentation to Parliament.

II.

The President and Council of the Royal Society shall approve the proposed alteration of the Articles, and shall, in accordance therewith, appoint seven or more persons, not exceeding ten in all, to form the Meteorological Council, and shall, in the first instance, appoint four members of the Association, and four only, besides the Hydrographer to the Admiralty, to be Directors, and shall appoint one of the Directors to be Chairman; and shall resolve that the number of Directors shall not be subsequently changed without consultation with the Meteorological Council. If the Meteorological Council object to any proposed change, no such change shall be effected without the approval of the Treasury.

III.

The Directors shall receive a remuneration for their services, but the total sum allotted yearly for this purpose shall not exceed £1,000, the amount authorised by the Treasury. The apportionment of this sum shall be regulated by a Resolution of a General Meeting of the Association, subject to the approval of the President and Council of the Royal Society. Provided always that (1) the yearly sum allotted to the Chairman shall not exceed £300; (2) the yearly sum allotted to any other Director shall not exceed £125 with the addition of travelling expenses; (3) the Hydrographer to the Admiralty shall be remunerated by a yearly payment proportionate to the number of his attendances at the Meetings of the Directors.

Articles of Association.

(Passed at an Extraordinary General Meeting of the Meteorological Council, held on November 21st, 1900; confirmed, December 19th, 1900. Registered, 21st December, 1900).

(1.) For the purposes of registration the number of the Members of the Association is declared not to exceed ten.

(2.) These Articles shall be construed with reference to the provisions of the Companies' Act, 1862, and the Companies' Act, 1867, and terms used in these Articles shall be taken as having the same respective meanings as they have when used in these Acts.

(3.) The Association is established under the authority of the Lords Commissioners of the Treasury, for the purposes expressed in the Memorandum of Association.

(4.) *Admission of Members.*—The Association shall consist of the Meteorological Council—a body of seven or more persons, not exceeding ten in all, of whom one is the Hydrographer to the Admiralty for the time being, and the others are nominated by the President and Council of the Royal Society.

(5.) *Management of the Association.*—The business of the Association shall be managed by a body of Directors, of whom the Hydrographer to the Admiralty shall be one. The President and Council of the Royal Society shall from time to time appoint as many other Members of the Association as they may think fit, and for such periods as they may think fit, to be such Directors.

(6.) *Nomination of Chairman.*—The Chairman shall be one of the Directors, and shall be appointed from time to time by the President and Council of the Royal Society.

(7.) *Appointment of Secretary.* — The Secretary shall be appointed from time to time by the Directors, and may be one of the Directors.

(8.) *Meetings, Proceedings, &c.*—A General Meeting of the Association shall be held at least once in each year, in accordance with Section 49 of the Companies' Act of 1862. The meetings of the Directors shall be held as the Directors shall appoint, and their proceedings shall be regularly recorded and printed. The Association shall submit, yearly, a report of its proceedings to the Royal Society for presentation to Parliament.

(9.) *Accounts, Audit.*—The Annual Estimates shall be submitted for approval to the Treasury, and the accounts, after examination by two members of the Association, shall be sent to the Treasury for audit.

(10.) A notice may be served by the Association upon any Member, either personally or by sending it through the post as a prepaid letter, addressed to such Member, at his registered place of abode. Any notice, if served by post, shall be deemed to have been served at the time when the letter containing the same would be delivered in the ordinary course of the post, and in proving such service it shall be sufficient to prove that the letter containing the notice was properly addressed and put into the Post Office.

(11.) *Temporary Provision.*—Until the appointment of Directors by the Royal Society under the provisions of Article 5 shall have been made, the business of the Association shall continue to be managed by the Members of the Meteorological Council as heretofore constituted.

From the ROYAL SOCIETY to the METEOROLOGICAL COUNCIL.

The Royal Society,

SIR, March 26th, 1901.

I AM directed to make known to you the following decisions of the President and Council of the Royal Society in regard to the Meteorological Council and Association.

The President and Council accept the resignation of Mr. Francis Galton as a member of Council, and, in doing so, wish to record their appreciation of his long and valuable services.

They nominate Sir Richard Strachey, Professor G. H. Darwin, Dr. Buchan, and Mr. Shaw to be, with the Hydrographer to the Admiralty, the Directors. They further nominate General Sir Richard Strachey as Chairman.

They have come to the conclusion that it will be desirable to appoint five other persons to bring up the number of members of the Association to ten, and for that purpose nominate as members the Earl of Rosse, Mr. J. Y. Buchanan, for a period of five years, and Mr. Dines, Professor Schuster, and Dr. R. H. Scott, for a period of three years.

They take it for granted that these additional five members will not be often required to attend meetings of the Council; possibly one or two meetings a year, in addition to the statutory annual meeting, will be all that is desirable. And they are of opinion that these gentlemen should not receive any honorarium for their attendance. Indeed, they have reason to believe that their acceptance of a honorarium would present legal difficulties.

I am, &c.,

M. FOSTER,

Secretary, R.S.

The Secretary,
The Meteorological Council.

APPENDIX II.

STATEMENT OF PROVISIONS FOR THE SUPPLY OF INFORMATION TO THE PUBLIC.

THE METEOROLOGICAL OFFICE, 63, Victoria Street, London. S W

COUNCIL.

Directors :

Lieutenant-General Sir Richard Strachey, R.E., G.C.S.I., LL.D., F.R.S., Chairman.
Mr. Alexander Buchan, M.A., LL.D., F.R.S., F R.S.E.
Professor George Howard Darwin, M.A., LL.D., D.Sc., F.R.S.
Rear-Admiral Sir William J. L. Wharton, K.C.B., F.R.S., Hydrographer to the Admiralty.
Mr. William Napier Shaw, M.A., F.R.S., Secretary.

Other Members of the Council :

The Earl of Rosse, K.P., D.C.L., LL.D., F.R.S.
Mr. John Young Buchanan, M.A., F.R.S., F.R.S.E.
Mr. William Henry Dines, B.A., Pres. Roy. Met. Soc.
Professor Arthur Schuster, Ph.D., F.R.S., F.R.A.S.
Mr. Robert Henry Scott, M.A., D.Sc., F.R.S.

Marine Superintendent :

Commander Campbell Hepworth, R.N.R.

The Meteorological Office was established in the year 1867 under the control of a Committee appointed by the Royal Society, at the instance of the Board of Trade, the Admiralty, and the Treasury, to take over the duties of the Meteorological Department of the Board of Trade, which had been established in 1854.

The Office was accordingly charged with the duty of collecting meteorological reports by telegraph from stations in the British Isles and their immediate neighbourhood, with a view to the issue of storm warnings and forecasts of weather; of collecting for public use statistics about the weather from land stations in the British Isles and elsewhere, as well as from ships of the Royal Navy and the Merchant Service; and of promoting the practical applications of the science of meteorology by special researches.

A parliamentary grant was assigned for the maintenance of the Office. Changes have been made from time to time in the arrangements, and the control is now vested in a body of Directors appointed by the Royal Society.

The Office receives a large number of daily reports, and has gradually accumulated a valuable store of information about the

weather in all parts of the world. The arrangements specified below have been made to enable the public to take advantage of this information.

The Office is open for general inquiries between the hours of 10 a.m. and 4 p.m. on week days (Saturdays, 1 p.m.), and for telegraphic inquiries from 8.30 a.m. to 8 p.m. on week days, and from 6 to 8 p.m. on Sundays.

A. Telegraphic Information.

Daily Weather Reports. Forecasts and Storm Warnings.

Daily information received.

Between 8.30 a.m. and 10 a.m. telegraphic messages are received daily, reporting meteorological observations at 25 stations (*see* list of stations, p. 55) in the British Isles, chiefly on the coast, and at 29 stations on the Continent of Europe. The observations in the British Isles are made at 8 a.m., and on the Continent partly at 7 a.m. and partly at 8 a.m. A certain number of stations report evening observations (6 p.m.), also by telegram, and those that do not report in the evening include the evening observations with the following morning reports, so that a complete schedule of morning and evening observations is drawn up daily. The information refers to the readings of the barometer; dry and wet bulb thermometers; maximum and minimum thermometers; rainfall and, in some cases, sunshine, with estimates of the direction and force of the wind, and reports of the weather and state of the sea.

These reports are supplemented by telegraphic reports from the Azores, through the courtesy of the Portuguese Government, by a number of additional observations made at various stations in the United Kingdom, and sent either by telegram or by post through the courtesy of private persons or local officials. Moreover, the "Bulletin International," published in Paris, reproducing meteorological telegrams from the whole of Europe, is received by post on the morning of the day after publication, and supplements the information previously received in the Office by telegram.

The telegraphic information is tabulated and charted by about 10 a.m. for the morning observations, and 7 p.m. for the evening ones. A general report is then drawn up, and forecasts of the weather for the twenty-four hours following the next noon, or midnight, as the case may be, are formulated.

Daily Weather Report.

A Daily Weather Report, which includes a transcript of the observations for the day, with some of those for the previous day, illustrative charts, descriptive remarks on the state of the weather, and forecasts for the several districts of the British Isles, is prepared for press and sent to the lithographers at 12 noon daily, except Sundays and Bank Holidays. It is ready for issue by 2 p.m., and is then delivered by hand or posted by book post at 2.30 p.m. to those addresses which can be reached in the regular course of post on the same day. Copies for those who are outside this limit are posted by the evening mails.

The Daily Weather Report may be obtained on payment at the Meteorological Office of a subscription (for not less than a

quarter of a year ending at the official quarter days, *e.g.*, March 31, June 30, &c.) at the rate of £1 per annum for delivery by book post, £2 for delivery, where feasible, by hand. Single copies, price 1*d.* each, can be obtained after 3 p.m. on the day of issue at the Office, and at Messrs. W. H. Smith & Son's railway bookstalls at the following terminus stations :—Victoria, Charing Cross, King's Cross, St. Pancras, Euston.

Subscribers for the Daily Weather Report receive monthly lists of "Corrections and Additions," and occasional supplements giving statistical meteorological results for the stations sending daily telegraphic reports.

Reports for the Press.

Special advance copies of the descriptive remarks on the state of the weather and the forecasts, based upon the morning or evening observations, are prepared at 11 a.m. and 7.30 p.m. respectively, and are supplied gratis to the representative of any newspaper or press agency calling for them at the Office at the hours named.

As far as practicable the Council make arrangements for daily or weekly reports of the state of the weather in special form, upon terms which may be had upon application at the Office personally or by letter.

Forecasts.

Printed copies of the morning forecasts for all districts are ready at 11 a.m., and are distributed by hand to clubs and societies situated in or near Pall Mall at a charge of 10*s.* per annum. They are sent by post at a charge of 2*s.* 6*d.* per official quarter or any part thereof, in addition to the cost of transmission. Copies of the evening forecasts are sent by post for a similar charge.

Forecasts for separate districts, and other extracts from the daily Reports.

For the purposes of the forecasts of weather the British Isles are divided into eleven districts, as indicated in the accompanying map. A written copy of the latest forecast for a single district can be obtained at the Office between 9.30 a.m. and 8 p.m. upon payment of 6*d.* A written copy of the latest information in possession of the Office as to the state of the weather in any district of the British Isles, and for the neighbouring parts of the continent of Europe, can be obtained in like manner. The latest reports, with a map, are exhibited as early as possible for the information of the public at the entrance to the Office, and abbreviated reports for a few coast stations are displayed in the Street on the balcony of the Office.

0. SCOTLAND, NORTH.
1. SCOTLAND, EAST.
2. ENGLAND, N.E.
3. ENGLAND, EAST.
4. MIDLAND, COUNTIES.
5. ENGLAND, SOUTH, and English Channel.
6. SCOTLAND, WEST, with Isle of Man.
7. ENGLAND, N.W., with North Wales.
8. ENGLAND, S.W., with South Wales.
9. IRELAND, NORTH.
10. IRELAND, SOUTH.

Inquiries by telegraph.

By arrangement with H.M. Postmaster-General the latest information as to the state of the weather in various parts of the United Kingdom, or the Continent, and forecasts for one day in advance can be obtained from the Meteorological Office, upon payment at any Postal Telegraph Office of a fee of 6*d.* in addition to the cost of a telegram of inquiry addressed "Weather, London," and of the reply. Ten words, in addition to the address, must be allowed for the reply.

Telegrams of inquiry should state the nature of the information required, and the name and address to which the information is to be sent, as in the following examples :—

To "Weather, London."

Latest Information from [*Straits of Dover*].

or,

Latest Forecast for [*Forfarshire*].

or,

Next Forecast for [*Dublin*].

From (Name), (Address).

The latest information for any district, or the latest forecast, will be sent by telegraph to any address if a request be received by post stating when the information or forecast is to be sent, and enclosing 6*d.* in addition to the cost of a telegram, allowing ten words in addition to the address. It should be noted that forecasts are prepared for issue at 11 a.m. and 7.30 p.m.

Forecasts for a single district will be sent regularly to public bodies for exhibition without any charge beyond the cost of the telegrams, and to private persons at additional charge of 3*d.* per telegram for a forecast for a single district, and 6*d.* for two or more districts.

Harvest forecasts.

The Council have made arrangements for a special service of afternoon reports during the season of the Hay and Corn Harvests (June 1st to September 30th), whereby they are enabled to issue a special series of forecasts daily (Sundays excepted) at 3.30 p.m. The forecasts for any district are supplied by telegraph to agriculturalists and others upon prepayment of the cost of the telegrams (nine words daily, in addition to the address) for the period during which the forecasts are required. Forms of application for these forecasts can be obtained at the Office.

The Postmaster-General has sanctioned the exhibition of Forecasts at Local Post Offices, provided space is available, if the persons to whom they are addressed desire them to be so exhibited.

Transcripts of the observations.

As far as practicable the Council, upon application, will make arrangements for the transcription of the whole or a selection of the morning or evening telegraphic reports, to be sent by telegraph, in code form, to newspapers or public associations desiring to make use of this means of accelerating the distribution of the latest information about the weather. The special terms for this service can be obtained on application to the Office.

Storm Warnings.

The Office issues notices of threatening atmospherical disturbances on or near the coasts of the British Islands (free of charge) to ports and fishing stations recommended by responsible local authorities.

The fact that one of these notices has been received at any station is made known by hoisting a black canvas cone, 3 feet high, and 3 feet wide at base, which has the appearance of a triangle when hoisted. The telegram directing the cone to be hoisted is exhibited near the signal staff.

At dusk, whenever a signal ought to be flying if it were daylight, a night signal, consisting of three lanterns hung on a triangular frame, may be hoisted in place of the cone.

The Meteorological Office supplies the canvas cone, but does not undertake to supply the lanterns. In all cases the local authorities must undertake the charges incidental to the hoisting of the signal, such as flagstaff and gear, oil, &c., and also as to the keeping of the apparatus in repair, painting, &c.

The following is a list of the stations to which storm-warning telegrams are sent :—

NORTHERN.	WESTERN.	SOUTHERN.	EASTERN.
SCOTLAND, N.E.	IRELAND, S.W.	ENGLAND, S.W.	ENGLAND, N.E.
Lerwick.	Tuskar L.H.	The Lizard.	Berwick-on-Tweed.
Scalloway.	New Ross.	Falmouth.	Cullercoats.
Dunrossness.	Dunmore East.	Pendennis.	Tynemouth.
Sumburgh Hd. L.H.	Dungarvan.	Mevagissey.	South Shields.
Noup Head L.H.	Minehead L.H.	Mount Batten.	Souter Point L.H.
Stromness.	Youghal.	Plymouth.	Sunderland.
Kirkwall.	Queenstown.	Devonport.	Hartlepool.
Cantick Head L.H.	Cork.	Prawle Point.	Middlesborough
Holborn Head.	Passage.	Teignmouth.	Redcar.
Dunnet Head.	Kinsale.	Exmouth.	Whitby.
Wick.	Do. (Old Head).		Filey.
Tarbet Ness L.H.	Galley Head L.H.		Flamborough Hd.
Avoch.	Castletownshend.		Bridlington.
Inverness.	Fastnet Rock L.H.		Hull.
Nairn.	Brow Head.		Goole.
Burghead.	Tralee.		Grimsby.
Lossiemouth.	Limerick.		Boston.
Buckie.	Loophead L.H.		
Port Knockie.	Galway.		
Cullen.			
Portsoy.	IRELAND, N.W.		
Banff.			
Fraserburgh.	Killybegs L.H.		
Peterhead.	Tory Island L.H.		
Aberdeen.	Lough Swilly L.H.		
Girdleness L.H.	Rathmullan.		
	Malin Head.		
	Portrush.		
	Port Ballintrae.		
	Ballycastle.		

[*Continued*

List of Storm-Warning Stations—*continued.*

NORTHERN.	WESTERN.	SOUTHERN.	EASTERN.
Scotland, E.	**Irish Sea.**	**England, S.**	**England, E.**
Stonehaven.	Belfast.	Guernsey.	Sutton Bridge.
Montrose.	Donaghadee.	St. Helier's (Jersey).	Lynn.
Scurdy Ness L.H.	Burr Point.	Gorey „	Sheringham
Broughty Ferry.	Howth.	Portland L.H.	Cromer.
Dundee.	Kingstown.	Weymouth.	Great Yarmouth.
St. Andrews.	Pt. of Ayre (I. of M.)	Anvil Point L.H.	Southwold.
Anstruther.	Ramsey „	Poole.	Orford Ness L.H.
Pittenweem.	Douglas „	Hurst Castle L.H.	Ipswich.
Buckhaven.	Castletown „	Southampton.	Harwich.
Methil.	Silloth.	Hamble.	Gunfleet L.H.
Wemyss, West.	Maryport.	Yarmouth.	
Burntisland.	Workington.	Cowes.	
Grangemouth.	Whitehaven.	Ryde.	
Bo'ness.	Barrow.	St. Catherine's Pt.	
Granton.	Walney I. L.H.	Portsmouth.	
Newhaven.	Morecambe.	Littlehampton.	
Leith.	Fleetwood.	Brighton.	
Fisherrow.	Blackpool.	Newhaven.	
Dunbar.	Lytham.		
Cockburnspath.	Southport.		
St. Abb's Head.	Formby.		
Eyemouth.	Liverpool.		
	Runcorn.		
	Hoylake.		
	New Brighton.		
	Connah's Quay.	**England, S.E.**	
Scotland, N.W.	Penmaenmawr.	Beachy Head.	
Fair Isle L.H.	Port Penrhyn.	Eastbourne.	
C. Wrath L.H.	Point Lynas L.H.	Hastings.	
Stourhead L.H.	Skerries L.H.	Rye.	
Port of Ness.	Holyhead.	Sandgate.	
Stornoway.	South Stack L.H.	Folkestone.	
Island Glass L.H.	Caernarvon.	Dover.	
Portnaguiran.	Port Dinorwic.	Deal.	
	St. George's Channel.	Ramsgate.	
	Aberystwyth.	Margate.	
	Milford.	Faversham.	
		Sheerness.	
Scotland, W.	**Bristol Channel.**	Chatham.	
Glasgow.	Small's L.H.	Greenhithe.	
Greenock.	Caldy L.H.		
Rothesay.	Pembrey.		
Lamlash.	Llanelly.		
Carradale.	Swansea.		
Campbelton.	Briton Ferry.		
Mull of Cantire L.H.	Porthcawl.		
Rhuvaal L.H.	Nash L.H.		
Rhinns of Islay L.H.	Penarth.		
Ardrossan.	Cardiff (Bute Dock).		
Girvan.	Do. (Barry Dock).		
Ballantrae.	Newport.		
Cairn Ryan.	Weston-super-Mare.		
Corsewall Point L.H.	Burnham.		
Mull of Galloway L.H.	Bridgewater.		
	Lundy Island.		
	Ilfracombe.		
	Bull Point L.H.		
	Barnstaple.		
	Appledore.		

[*Continued*

LIST OF STORM-WARNING STATIONS—*continued.*

NORTHERN.	WESTERN.	SOUTHERN.	EASTERN.
	BRISTOL CHANNEL —*cont.* Hartland Pt. L.H. Boscastle. Port Isaac. Newquay. Hayle. Godrevy L.H. St. Ives. St. Sennen. Newlyn, West. Penzance. Scilly.		

B. INFORMATION RECEIVED WEEKLY.

METEOROLOGICAL STATISTICS FOR AGRICULTURAL AND SANITARY PURPOSES.

WEEKLY WEATHER REPORT, WITH MONTHLY AND ANNUAL APPENDICES.

The Weekly Weather Report, which has been continued in its present form since 1890, is published on Thursdays, and gives, for the week ended on the preceding Saturday, a summary of temperature, rainfall, and duration of bright sunshine in the United Kingdom for agricultural and sanitary purposes. To this is added a series of maps showing the distribution of pressure and wind over the whole of Europe at 8 a.m. and 6 p.m. on each day, and the temperature, weather, and sea disturbance at 8 a.m. each day. The maps for each day are accompanied by a brief account of the distribution of weather for that day and the changes that have taken place. There is also appended a general summary of the weather over Europe for the week.

For the maps and descriptive account, the daily telegraphic reports are used, and are supplemented by the information contained in the "Bulletin International" already referred to (p. 42), so that the area represented is much larger than that covered by the Daily Weather Report.

For the statistical summaries, the information from the 25 telegraphic reporting stations in the British Isles is supplemented by weekly returns of daily observations of maximum and minimum temperature and rainfall supplied by volunteer observers from 37 other stations, marked F in the list on pp. 56 to 61, and by a number of observations of duration of bright sunshine at stations marked S in the list, which brings up the number of stations making sunshine returns to 68. The summaries refer to districts which are identical with the forecast districts of the Daily Weather Report, and they are grouped into wheat producing districts and grazing districts.

In the data for temperature are included not only statistics of mean and extreme temperatures for the week, but also weekly and progressive statistics of accumulated temperature, of which the following brief explanation may be given.

The tables of *Accumulated Temperature* are designed to give persons engaged in agriculture better means for estimating the manner in which vegetation is affected by temperature than that afforded by the more usual methods of treating the readings of the thermometer. They show for each week, and for the whole period from the beginning of the year, the weekly and progressive values respectively of the combined amount and duration of the excess or defect of the air temperature, above or below a suitably fixed standard, or *base temperature.* The base value adopted is 42° Fahr.

Accumulated Temperature is expressed in *Day degrees*, a Day degree signifying 1° F. of excess or defect of temperature above or below the base (42° F.) continued for 24 hours, or any other number of degrees for an inversely proportional number of hours.

The following are the rules for computing, from the observed maxima and minima, the accumulated temperature above or below 42° F. for a weekly period :—

1. Obtain the mean temperature, from the means of the seven observed maxima and minima, suitably corrected for non-periodic changes of temperature.

2. In obtaining the accumulated temperature four cases may occur, to which the following rules will apply :—

Conditions of Temperature.	To obtain the daily Accumulated Temperature.	
	Above 42° F.	Below 42° F.
If the minimum is *above* 42° F., or *equal* to 42° F.	Subtract 42° F. from the mean.	There is none.
If the minimum is *below* 42° F., but the mean for the day is *above* 42° F.	From the difference between the mean for the day and the minimum deduct the accumulated temperature below 42° F., calculated as stated in the next column.	The required quantity is the excess of 42° F. over the minimum, multiplied by the coefficient 0·4.
If the mean for the day is *below* 42° F., but the maximum is *above* 42° F.	The required quantity is the excess of the maximum over 42° F., multiplied by the coefficient 0·4.	From the difference between the mean for the day and the minimum deduct the accumulated temperature above 42° F., calculated as stated in the preceding column.
If the maximum is *below* 42° F., or *equal* to 42° F.	There is none.	Subtract the mean from 42° F.

In each of the above cases the result will be the average *daily* value, and must be multiplied by 7 in order to obtain the value for the whole week.

The coefficient varies with the duration of the period, and also with the base temperature.

The coefficient given in the second and third rules of the preceding table is for a weekly period, and for the base temperature 42° F. The following are its values for other base temperatures :— for 32° F., 0·4 ; for 52° F., 0·33 ; for 62° F., 0·25.*

Subscribers for the Weekly Weather Report receive also the following supplements and appendices.

I. *A Monthly Supplement* giving (1) a climatological summary of the observations at the Telegraphic Reporting Stations; (2) a summary of maximum and minimum temperature, rainfall, and sunshine at the additional stations which furnish weekly returns. In the case of instrumental observations a comparison with the average is included in each of these summaries. (3) Four maps showing the average distribution of barometer and wind, the movements of barometric depressions, the distribution of mean temperature, and the distribution of rainfall.

II. *Appendix I.* Containing, (1) a quarterly and annual summary of rainfall and mean temperature of each district compared with the corresponding quarter or the whole year for each of the past ten years, and with each of the corresponding five yearly means for thirty-five years ;

(2) A table of the driest and wettest, the coldest and warmest corresponding quarters and years ;

(3) Monthly totals of rainfall, accumulated temperature and sunshine, together with progressive totals for each month of the quarter.

III. *Appendix II.* Weekly and progressive totals of rainy days, rainfall, accumulated temperature, and duration of sunshine with percentage of possible amount for the whole year for the several districts.

IV. *Appendix III.* Appears every fifth year and gives the weekly and progressive values of the different elements in each five years and for the whole period since 1881.

V. *Appendix IV.* Also appears every fifth year and gives for each district a comparison of the mean of the average temperature of successive weeks for the preceding five years with the corresponding value for the whole period defined above.

Advance copy for the use of newspapers.

An advance copy of the MS. of the Report is prepared on Tuesday in each week, and is supplied free of charge to newspapers, together with the weekly summary which occupies the first page of the Report.

The Report is published every Thursday afternoon by the Publishers to the Stationery Office, Messrs. Eyre & Spottiswoode, East Harding Street, E.C., Oliver & Boyd, Edinburgh, and E. Ponsonby, 116, Grafton Street, Dublin. The annual subscription is £1 10*s.*, post paid. Single copies are sold at 6*d.* each, exclusive of postage, and the separate appendices are priced at from 4*d.* to 1*s.*

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* A full explanation of the principles on which these rules are based will be found in Appendix II. to the Quarterly Weather Report for 1878.

C. Information from other Stations in the British Isles.

The Council maintains a fully equipped meteorological Observatory at Valencia (Cahirciveen), Co. Kerry, Ireland. They have also established instruments and subsidised the observatories at Kew, Falmouth, Aberdeen, and those at the foot and the summit of Ben Nevis. They receive in return curves and hourly tabulations of pressure, dry bulb temperature, wet bulb temperature, rainfall, direction and velocity of the wind, together with sunshine records from the five observatories first named, and copies of the hourly readings from the summit of Ben Nevis.

An annual volume embodying the results of the observations at the five Observatories is published in the usual way. That for 1897 has recently been issued, price 37*s.* 6*d.*

In return for an annual grant they also receive duplicates of the curves from the self-recording instruments at Glasgow, Armagh, and Stonyhurst, and the tabulations of these curves are available if required.

Anemographic records are also received from Alnwick Castle, Deerness, Dublin, Kingstown, Holyhead, North Shields, Scilly and Yarmouth.

Sunshine records are received from 64 stations.

Normal climatological stations, equipped and maintained by volunteer observers or by local authorities at their own expense, supply monthly returns of readings of all the meteorological elements at 9 a.m. and 9 p.m.

The following extract from the complete Form will show the headings under which observations are recorded :

Twice daily (at 9 a.m. and 9 p.m.).							Once daily.		
Barometer.	Temperature.	Humidity.‡	Wind.	Cloud.	Weather.	Rain.	Temp.	Extra Observations.	

Attached Thermometer	Uncorrected.	Corrected and reduced to 32° Fahr. at mean sea level.	As read		Corrected.		Dew point.	Elastic Force of Aqueous Vapour	Percentage.	Direction.	Force (0-12).	Amount (0-10).	Form.	Direction of lower Stratum, whence coming.	At time of Observation.	Since last Observation.	At 9 a.m.	Estimated duration.	Corrected readings at 9 p.m.		Duration of Bright Sunshine.	Weather Symbols.	Remarks.
			Dry bulb.	Wet bulb.	Dry bulb.	Wet bulb.													Max.	Min.			

‡ Deduced from readings of dry-bulb and wet-bulb.

An annual volume embodying the results of these observations is published ; that for 1897 has recently been issued, price 22*s.*

Other Climatological Stations (including those which have already been referred to as contributing weekly returns) equipped and maintained in like manner, furnish periodical returns with less extensive information than that supplied by the normal climatological stations, or information of the same extent but with different hours of observation. Other stations furnish weekly readings of sea temperature.

All the stations in the British Isles from which information of any kind is received, and a statement of the nature of the information, are given in the list of stations appended hereto, and are shown upon pp. 56 to 61.

Extracts from the returns thus collected, whether published in the manner described or in manuscript, are supplied to any person upon making written application to the Secretary, specifying precisely the details of the information required. For these extracts a charge is made to cover the cost of the time required for selecting and making them. The information will, if required, be attested by a sworn declaration before a commissioner for oaths, at a fee of £1 1*s.* (in addition to the charge of 1*s.* 6*d.* made by the Commissioner for oaths). A special fee of £2 2*s.* for each day's attendance is charged if a representative of the Council is required to attend in court to prove the statements contained in the extracts supplied.

D.—Information from Land Stations outside the British Isles.

Periodical returns are received by the Council from the stations in different British Colonies and dependencies, or in foreign countries, as follows :—Antigua, Bahamas (six stations), Barbados, Beyrout, Falkland Islands, Cape Spartel, Colon, Cyprus (six stations), Fort Rae,* British Guiana, Gibraltar, Gold Coast (eight stations), Lagos, Madagascar, Port Natal,* St. Helena (three stations), Sierra Leone, Sombrero, Teneriffe.

A list of the documents received from these stations is given on pp. 65 to 67.

Extracts from these returns are supplied upon the same terms as those from the returns of British Stations.

E.—Marine Observations.

The information as to the meteorology of the sea collected by the Office since 1855 is contained in a large number of logs kept by the officers of His Majesty's ships, or of the Mercantile Marine, and forwarded to the Office. The information is regularly discussed and arranged according to the squares of latitude and longitude, embracing 10 degrees in each direction, and again sub-divided according to one degree squares. The information is then compiled statistically, and is represented by a series of publications, of which a list can be obtained on application to the Office.

Commencing with April of the current year (1901), a series of Pilot Charts of the North Atlantic and Mediterranean is being issued. These are supplied by the Superintendents of the Mercantile Marine Offices at the principal British ports to captains and officers of merchant ships, at the price of 6*d.* each. Copies can also be obtained from the Publishers to the Stationery Office at the price of 5*s.* for an annual series of 12 charts, or 6*d.* for each chart, in addition to the cost of transmission.

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* Observations from these Stations are exceptional.

The marine observations are by voluntary observers. Those officers whose names are on the list of observers for the Office receive the Pilot Charts free, and also receive from time to time copies of the other marine publications issued by the Office.

F.—The Library.

In return for copies of publications issued by the Council the Office receives the weather reports and other publications of the official meteorological organisations of the world and of many private organisations.

The library has also gradually acquired a large collection of pamphlets and books bearing upon meteorological subjects. These publications are available, free of charge, for the purposes of study and research, upon application at the Office, between the hours of 10 a.m. and 4 p.m. (Saturdays, 1 p.m.).

G.—Supply of Instruments to Observers.

In accordance with the terms of the Parliamentary grant the Council does not lend instruments for the use of observers except in the following cases :—

(1.) To the Ships of the Royal Navy.

(2.) To the Captains of Merchant vessels who undertake to keep a Meteorological log during their voyage and forward it to the Office.

(3.) To the Telegraphic Reporting Stations in the British Isles.

(4.) To the First Class Observatories in connexion with the Office, and

(5.) To a few Coast Stations in less frequented parts of the world where observations are deemed to be specially desirable.

The Council are prepared to supply, at a cost of 5 per cent. in addition to their contract prices and the cost of carriage, trustworthy instruments to those who are willing to send copies of their observations to the Office. The risk of breakage in transit must be undertaken by the consignee. The Council will also supply free of cost blank registers for the returns of the observations and forms for anemographs and sunshine recorders, and will, if desired, give advice about the site and exposure of the instruments.

A book of "Instructions in the use of Meteorological Instruments" has been prepared in the Office, and is sold by Messrs. Eyre and Spottiswoode, East Harding Street, E.C., and the other agents for the sale of Stationery Office publications, price 2*s*. 6*d*. A new edition of this publication is now being prepared.

The supply of instruments to His Majesty's ships is conducted through the Admiralty. The officers of the Mercantile Marine are supplied either directly from the Office or through the following agents :—

Cardiff—T. L. Ainsley, Bute Dock.
Dundee—Captain John McGlashan, 33, Dock Street.
Glasgow—Messrs. D. McGregor & Co., 37 & 38, Clyde Place.
Greenock—Messrs. D. McGregor & Co., 32, Brymner Street.
Hull—Messrs. Castle & Co., Commercial Road.
Liverpool—Messrs. D. McGregor & Co., 39, South Castle Street.
Southampton—Captain D. Forbes, 169, High Street.

For the supply of instruments on commission for observers, or for Distant Coast Stations, application should be made to the Office.

Fishery Barometers.

The Council have been in the habit of supplying Barometers for the use of fishing communities, after due inquiry into the requirements and the resources of the localities applying for them, where it is shown that the instrument will be of material service. As a condition for the loan the community is required to provide for the housing of the instrument and to keep and forward to the Office a record of daily readings. A copy of a manual specially compiled for the purpose accompanies the instrument, and is intended to point out in simple language the practical use of the Barometer with a view to anticipating important changes in the weather in the neighbourhood of the fishing stations. The following is a list of stations that have been supplied with Fishery Barometers :—

List of Places supplied with Fishery Barometers.

Shetland Isles.—Balta Sound, Uya Sound, Burravoe, Nesting, Lerwick, Sandwick, Scalloway, Symbister.

Orkney Isles.—Westray, Papa Westray, Burray, Kirkwall.

Scotland, east coast.—Duncansbay, Freswick, Auchengill, Keiss, Ackergill, Staxigoe, Wick, Lybster, Dunbeath, Inver, Portmahomack, Ballintore, Cromarty, Avoch, Nairn, Burghead, Portessie, Port Knockie, Portsoy, Whitehills, Gardenstown, Rosehearty, Pitullie, Fraserburgh, Inverallochy, Pointlaw, Findon, Portlethen, Skateraw, Stonehaven, Arbroath, East Haven, Broughty Ferry, St. Andrews, Crail, Cellardyke, St. Monance, Burntisland, Newhaven.

England, east coast.—Berwick, North Shields, South Shields, Sunderland, West Hartlepool, Staithes, Scarborough, Filey, Flamborough, Bridlington Quay, Withernsea, Hull, Lynn (2), Wells, Gorleston, Lowestoft, Orford Haven, Felixstowe, Harwich, Brightlingsea, West Mersea, Maldon, Leigh, Margate, Deal, Kingsdown, Dover.

England, south coast.—Bognor, Ryde, Bembridge, Brixton, Atherfield, Ventnor, Yarmouth (Isle of Wight), Gorey (Jersey), Haslar Hospital, Poole, Weymouth, Portland, Budleigh Salterton,

Exmouth, Cawsand, Mevagissey, Gorranhaven, Devoran, Portscatho, Penryn, Durgan, Porthallow, Falmouth, Coverack, Newlyn (2), Mousehole, Penberth, Porth Guarra.

England, south-west coast.—St. Ives, Hayle, Port Isaac, Boscastle, Bideford, Burnham, Highbridge, Weston-super-Mare.

Wales.—Briton Ferry, Swansea, Angle, Milford, Aberystwyth, Nevin, Carnarvon.

England, north-west coast.—Fleetwood, Morecambe, Maryport.

Isle of Man.—Douglas, Port St. Mary, Peel (2).

Scotland, south-west coast.—Port Patrick, Stranraer.

Ireland, east coast.—Cushendall, Belfast, Bangor, Groomsport, Donaghadee, Ardglass, Warren Point, Carlingford, Glenarm, Greenore, Dundalk, Malahide, Howth, Kingstown (2), Bray, Wicklow.

Ireland, south coast.—Dunmore East, Dungarvan, Crosshaven, Kinsale, Union Hall, Castletownsend, Baltimore, Schull (2), Crookhaven, Castletown (Berehaven), Lawrence Cove, Ballydonegan, Ballycrovane.

Ireland, west coast.—Valencia, Dingle, Tralee, Ballyheigue, Tarbert, Kilcredane, Kilronan, Galway, Spiddal, Elly Bay, Cleggan, Ballyglass, Ballycastle (Co. Mayo), Donegal, Tribane, Killybegs, Teelin, Malinmore, Portnoo, Burton Port, Kincaslagh, Bunbeg, Inniscoo.

Ireland, north coast.—Dunfanaghy, Rathmullen, Buncrana, Malin Head, Moville, Greencastle, Portstewart, Portrush, Port Ballintrae, Ballycastle (Co. Antrim).

Scotland, west coast.—Lamlash, Tarbert (Loch Fyne), Loch Ranza, Campbeltown, Carradale, Portnahaven and Portwemyss (Islay), Portree and Armadale (Isle of Skye), Isle of Soay, Plockton, Ardneaskan, Shieldaig, Gruinard, Badachro, Ullapool, East Mey, Gills, Stroma (2), Bowmore (Islay), Kyle of Lochalsh.

Hebrides.—Stornoway, Portnaguran, Obb, Valtos, Carloway, Ness, Berneray, Marvaig.

LIST of STATIONS in the BRITISH ISLANDS from which INFORMATION has been received at the METEOROLOGICAL OFFICE during the Year ended March 31st, 1901.

The Stations marked "S" are in connexion with the Scottish Meteorological Society, and those marked "RM" are in connexion with the Royal Meteorological Society.

Where necessary the name of the nearest well-known village or town has been inserted within brackets following the name of the station.

The nature of the information received from each station is indicated by letters in the sixth column, as follows :—

A.—Continuous records of pressure, temperature, wind, sunshine, and rain, with eye observations of the amount, form, and motion of the clouds, and notes on the weather. (Observatories.)

B.—Continuous record of the direction and velocity (or force) of the wind. (Anemographic Stations.)

C.—Continuous record of pressure. (Barographic Stations.)

D.—Monthly sheets, containing the regular observations at 9 a.m. and 9 p.m. each day, local time, of pressure, temperature (dry bulb and wet bulb), wind, cloud, and weather, with the daily maximum and minimum of temperature, the daily rainfall, and general remarks on the weather. (Second Order Stations.)

E.—Monthly means and summaries of observations taken at 9 a.m. and 9 p.m. each day as above. (Second Order Stations.)

F.—The maximum and minimum temperature, and the rainfall for each day, with remarks on the weather. This information is received in the Meteorological Office each week for use in the "Weekly Weather Report."

G.—Observations of the same kind as at Second Order Stations, but either—(*a*) less full, (*b*) taken only once daily, (*c*) taken at hours other than 9 a.m. and 9 p.m. (Third Order Stations.)

R.—Monthly sheets containing the daily observations of the amount of rainfall, with remarks on the weather. (Third Order Stations.)

S.—Continuous record of bright sunshine. (Sunshine Stations.)

T.—Regular observations at 8 a.m. and 6 p.m. G.M.T. (and from some stations at 2 p.m. in addition), of pressure, temperature, wind and weather, with the daily maximum and minimum of temperature, the daily rainfall, and, where possible, the sea disturbance at 8 a.m. each day, and the daily amount of bright sunshine. This information is received each day by telegraph, for use in the "Daily Weather Report" and in the "Weekly Weather Report." (Telegraphic Stations.)

W.—Daily observations of the temperature of the sea water. (Sea Temperature Stations.)

	Station.	Lat.	Long.	Height in feet above M.S.L.	Observer.	Nature of Information supplied.	Year of last Inspection.
	Aberdeen Observatory ..	57 10	2 6 W.	46	Prof. C. Niven, F.R.S. ..	A. T. C	00
	„ Cove Bay	57 9	2 5 „	—	Coastguard	W.	—
	Aberdovey	52 33	4 4 „	—	John Edwards	S.	—
	Adare	52 33	8 47 „	—	W. Bowles	R.	—
	Alnwick Castle	55 25	1 43 „	210	Humphry Willyams, for the Duke of Northumberland.	B. F.	00
	Ampleforth	54 12	1 5 „	349	Rev. J. B. McLaughlin, B.A., O.S.B.	D.	00
	Ardross Castle, N.B... ..	57 45	4 21 „	449	W. Minty	R.	—
	Arlington Court(Barnstaple)	51 8	3 58 „	613	Lady Chichester	F.	99
	Armagh Observatory ..	54 21	6 39 „	196	J. L. E Dreyer, Ph.D. ..	B.D.F.S.	00
	Arran, North, Galway ..	53 6	9 40 „	—	Coastguard	G. W.	—
	Aspatria	54 46	3 21 „	250	J. Smith Hill, B.Sc. ..	D.	—
	Aspley Guise, Beds.	52 1	0 38 „	410	E. E. Dymond	S.	—
	Aysgarth Yorks	54 18	1 58 „	646	Rev. F. W. Stow, M.A. ..	D.	99
	Bahama Bank Lightship ..	54 20	4 13 „	—	Light-keepers	W.	—
	Ballantrae, Ayrshire ..	55 6	5 0 „	—	Coastguard	W.	—
	Ballydonegan, Co. Cork ..	51 38	10 3 „	—	„	W.	—
	Ballyglass, Co. Mayo ..	54 17	9 52 „	—	„	W.	—
	Baltimore, Co. Cork.. ..	51 28	9 22 „	—	„	G.	90
	Bath	51 23	2 21 „	—	W. H. Symons, M.D., for the Corporation.	T.S.	—
	Belfast, Queen's College ..	54 35	5 56 „	61	John Wylie	D.	00
	Belvoir Castle (Grantham)	52 54	0 47 „	259	W. H. Divers, for the Duke of Rutland.	D.	00
S	Ben Nevis	56 48	5 0 „	4,406	A. Rankin, for Directors Ben Nevis Observatory.	A. E.	—
M	Bennington, Herts.	51 54	0 5 „	407	Rev. J. D. Parker, LL.D.	E.	00
M	Berkhamsted	51 46	0 34 „	400	E. Mawley, F.R. Met. Soc.	E.	00
	Bettws-y-Coed	53 6	3 48 „	628	Col. Wynne Finch	R.	—
	Bexhill	50 51	0 28 E.	—	A. J. Brook	R.	—
	Bidston Observatory (Liverpool).	53 24	3 4 W.	188	W. E. Plummer, F.R.A.S.	D. T.	99
	Birr Castle (Parsonstown)	53 6	7 55 „	175	J. L. Roe and T. Colvin, for the Earl of Rosse.	D. S. T.	00
M	Blackpool	53 48	3 3 „	62	A. J. Anderson, M.A., M.B., for the Corporation.	F. S.	00
	Blacksod Point, Co. Mayo..	54 6	10 4 „	37	A. Marshall	W. T.	00
	Bognor	50 47	0 40 „	—	H. C. L. Morris, M.D., for the Corporation.	S.	—
	„	50 47	0 40 „	—	A. G. Thompson	G.	—
	Bolton	53 35	2 27 „	389	W. W. Midgley, for the Corporation.	G.	—
	Bournemouth..	50 43	1 53 „	—	C. Dales, for Town Council	S.	00
S	Braemar	57 0	3 24 „	1,111	J. Aitken, J.P.	D. F. S.	00
	Bramley, Surrey	51 11	0 33 „	148	J. Bartlett, M.A.	D.	00
	Bray, Co. Wicklow	53 12	6 6 „	—	Coastguard	G.	—
	Brighton	50 49	0 8 „	65	A. Newsholme, M.D., for the Corporation.	S.	96
	Broadstairs	51 21	1 26 E.	—	L. A. Skinner, for the District Council.	S.	—
	Burnmouth(Ayton,Berwick)	55 51	2 4 W.	—	Coastguard	W.	—
	Burntisland	56 4	3 14 „	—	„	W.	—
M	Buxton	53 14	1 54 „	987	W. Pilkington	E.	99
	Caernarvon Bay Lightship	53 6	4 45 „	—	Light-keepers	W.	—
	Cambridge	52 13	0 6 E.	83	Miss A. Walker, for Sir Robt. Ball, F.R.S.	S. D.	98
	Cardigan Bay Lightship ..	52 25	5 1 W.	—	Light-keepers	W.	—
S	Cargen	55 2	3 37 „	72	A. Peacock	R.	96
	Carrigallen, Co. Leitrim ..	53 58	7 38 „	350?	Mrs. J. Godley and Miss Morrow.	R.	—
	Chatham	51 23	0 32 E.	136	The Instructor in Surveying.	G.	99
	Chatsworth	53 14	1 37 W.	—	The Duke of Devonshire, K.G.	C.G.	—
M	Cheadle	52 58	1 57 „	646	J. C. Philips	E. F.	99
M	Cheltenham	51 54	2 3 „	184	R. Tyrer, B.A.	E.	96
	Chester (Hawarden Bridge)	53 12	3 1 „	..	F. B. Summers	F.	—
	Churchill, Oxon	51 56	1 34 „	509	Giles Edmonds	R.	96

Station.	Lat.	Long.	Height in feet above M.S.L.	Observer.	Nature of Information supplied.	Year of last Inspection.
	° ′	° ′				
Churchstoke	52 31	3 5 W.	538	P. Wright, F.C.S.	D. F. S.	98
Cirencester	51 43	1 57 „	446	Prof. G. T. Locke, M.A. ..	F. S.	00
Clacton-on-Sea	51 48	1 9 E.	—	A. W. Shadick, for the Town Council.	T.S.	—
Cleggan, Co. Galway ..	53 33	10 8 W.	—	Coastguard	W.	—
Clifton	51 27	2 37 „	230	D. Rintoul, M.A	F.	00
Colly Weston	52 37	0 31 „	280	Miss A. Tasker	F.	00
Colwyn Bay	53 17	3 43 „	—	R. E. Lord, M.D., B.Sc. ..	S.	97
Coningbeg Lightship ..	52 2	6 40 „	—	Light-keepers	W.	—
Cooper's Hill (Egham) ..	51 26	0 34 „	279	Prof. H. McLeod, F.R.S. ..	G.	98
Cranleigh	51 8	0 29 „	232	Rev. G. C. Allen	F.	
Cromarty	57 41	4 0 „	—	Coastguard	W.	—
Cronkbourne (Douglas) ..	54 10	4 29 „	137	A. W. Moore, M.A.	D. F. S.	99
Crookhaven	51 28	9 43 „	—	Coastguard	G.	90
Cro-shaven	51 48	8 18 „	—	„	G.	90
Cuckfield, Sussex	51 1	0 9 „	389	John Howe	R.	97
Cullompton	50 51	3 23 „	202	T. Turner, J.P. .. .	F. S.	00
Darwen, Lancashire ..	53 41	2 28 „	710	G. Mainland, for the Corporation.	S.	00
Deerness, Orkney Islands..	58 56	2 45 „	160	M. Spence	B. D. S.	00
Disserth (Llandrindod) ..	52 13	3 24 „	711	Rev. J. Le Herbert	R.	00
Donaghadee	54 38	5 32 „	40	J. Conolly	T.	00
Doneraile, Co. Cork.. ..	52 13	8 34 „	266	Capt. J. W. Evans, J.P. ..	R.	—
Dover	51 7	1 18 E.	198	H. E. Stilgoe, C.E.	R.	96
Dublin, Botanic Gardens ..	53 23	6 16 W.	67	F. W. Moore, M.R.I.A. ..	D.	00
„ City	53 20	6 15 „	47	Sir J. W. Moore, M.D. ..	D. F.	00
„ Phœnix Park ..	53 22	6 21 „	155	Major Haynes, R.E. ..	B. D. S.	00
Dundee	56 28	2 56 „	160	J. Carnochan..	D. S.	00
Dungeness	50 55	0 58 E.	26	W. H. Taylor..	T.	00
Dunrobin Castle	57 59	3 56 W.	12	D. Melville, for the Duke of Sutherland.	D.	00
Durham..	54 46	1 35 „	336	Prof. R. A. Sampson, M.A.	D. F. S.	00
Dursley, Glos.	51 41	2 21 „	250	R. W. Pinney..	R.	96
Eastbourne	50 46	0 17 E.	39	R. Sheward, for the Corporation.	D. S.	00
East Goodwin Lightship ..	51 13	1 36 „	—	Light-keepers	W.	—
East Dereham	52 41	0 57 „	158	G. H. H. Cooper	R.	—
Edgbaston (Birmingham)..	52 28	1 56 W.	534	Alf. Cresswell	D.F.S.	00
Edinburgh	55 57	3 12 „	253	R. C. Mossman, F.R.S.E. ..	D. S.	00
English and Welsh Grounds Lightship.	51 27	3 0 „	—	Light-keepers	W.	—
Ennis, Co. Clare	52 51	8 59 „	38	Miss A. L. Scott	R.	—
Ennistymon, Co. Clare ..	52 57	9 17 „	131	Rev. C. W. McDowell, M.A.	R.	—
Falmouth	50 9	5 4 „	167	E. Kitto	A. F.	00
Felixstowe	51 58	1 22 E.	76	Rev. J. G. Munday, M.A. ..	F. S.	00
Fleetwood	53 56	3 1 W.	—	M. S. Gaulter	B.	00
Forgandenny, Perth ..	56 21	3 29 „	175	C. L. Wood	C.	—
Forest Row, Sussex ..	51 7	0 2 E.	619	Rt. Hon. J. Bryce, D.C.L., M.P.	R.	—
Fort Augustus..	57 8	4 40 W.	68	Rev. C. von Dieckhoff ..	E. F. S	99
Fort William	56 49	5 7 „	31	A. Rankin, for Directors, Ben Nevis Observatory.	A. F.	00
Foynes, Co. Limerick ..	52 37	9 7 „	108	W. H. Ward, for Lord Monteagle.	F.	95
Fulbeck, Lincolnshire ..	53 3	0 37 „	185	Rev. V. F. Willson, M.A. ..	C. D	00
Geldeston (Beccles).. ..	52 28	1 31 E.	37	E. T. Dowson	D. F. S.	99
Glasgow	55 53	4 18 W.	180	Prof. L. Becker. Ph.D. ..	A. D. F.	00
Glenarm	54 58	5 56 „	—	Coastguard	G.	—
Glencarron	57 30	5 14 „	489	D. D. Munro	E. F.	00
Glenlee	55 5	4 12 „	203	W. Melville	E. F.	99
Gordon Castle..	57 37	3 5 „	101	C. Webster, for the Duke of Richmond and Gordon, K.G.	E.	00
Gorleston (Gt. Yarmouth)	52 35	1 43 E.	—	J. G. Bammant	G.	—
Haslar Hospital	50 47	1 7 W.	—	C. Seaman	G.	—

Station.	Lat.	Long	Height in feet above M.S.L.	Observer.	Nature of Information supplied.	Year of last Inspection.
	° ′	° ′				
Hastings, St. Helen's Cres.	50 51	0 34 E.	149 ?	Rev. H. H. Breton, M.A. ..	R.	99
„ Waterworks ..	50 51	0 34 „	—	— Farnham, for the Corporation.	S.	99
Hesley Hall (Bawtry) ..	53 27	1 4 W.	65	B. I. Whitaker, J.P. ..	F.	99
✠ Hereford	52 5	2 45 „	291	Rev. T. B. Harrington ..	F.	98
Hidcote (Campden), Glos...	52 6	1 46 „	524	Major W. Wright, R.A. ..	R.	97
✠ Hillington	52 48	0 33 E.	88	Rev. H. E. B. Ffolkes, M.A.	D. F. S.	99
Hollesley Bay, Suffolk ..	52 3	1 27 „	38	Prof. C. G. Freer Thonger, F.C.S.	D. S.	99
Holyhead, Harbour Office..	53 18	4 39 W.	57	F. M. Cotton, C.E.	B. W.	00
„ Sailors' Home ..	53 18	4 39 „	48	T. Chope	T.	00
Hoylake, Cheshire	53 23	3 12 „	—	L. G. Dashper	S.	—
Hurdlestown (Broadford), Co. Clare.	52 48	8 38 „	157	Lieut.-Col. W. O. Bentley, R.A.	R.	—
Kearsney Abbey (Dover) ..	51 8	1 17 E.	100 ?	C. W. Curtis	R.	99
„ Chilton Farm ..	51 8	1 17 „	135	H. E. Stilgoe, C.E.	R.	—
Ketton Vicarage	52 38	0 32 W.	109	Rev. A. Swire	R.	99
Kew Observatory	51 28	0 19 „	18	C. Chree, D.Sc., F.R.S. ..	A.	00
Kilcredane, Co. Clare ..	52 35	9 47 „	—	Coastguard	W.	—
Kilkenny	52 39	7 14 „	212	H. Carlton, for the Marquis of Ormonde.	C. F.	99
✠ Killarney	52 4	9 30 „	174	E. H Griffin, M.D.	G. F.	—
Killiney, Co. Dublin ..	53 16	6 7 „	249	R. O'Brien Furlong, C.B.	R.	95
Kingstown	53 17	6 8 „	—	H.M. Office of Works ..	B.	00
„	53 17	6 8 „	—	J. B. Power, for the Dist. Council.	G. S.	00
Kirkwall	58 59	2 57 „	—	Coastguard	W.	—
Kish Bank Lightship ..	53 19	5 55 „	—	Light-keepers	W.	—
Lahinch, Co. Clare	52 55	9 21 „	52	Miss I. F. K. Bowes ..	R.	99
Lairg	58 1	4 22 „	335	Rev. D. Macrae	E. F.	00
Lamlash, Isle of Arran ..	55 32	5 8 „	—	Coastguard	G. W.	—
Laudale, Argyleshire ..	56 41	5 41 „	14	A. Fletcher, for T. H. G. Newton, M.A.	D. F.	98
✠ Lednathie	56 45	3 7 „	719	W. Morrison, for P. Stormonth Darling.	E.	00
Leith	55 58	3 10 „	19	T. Richardson	T.	00
Leman and Ower Lightship	53 8	2 2 E.	—	Light-keepers	W.	—
Lerwick	60 9	1 8 W.	—	Coastguard	W.	—
Limerick	52 39	8 36 „	—	A. W. Shaw	R.	95
Liscannor, Co. Clare ..	52 56	9 23 „	—	Coastguard	W.	—
✠ Lissan, Co. Tyrone	54 41	6 45 „	300	——	E.	98
Littlestone-on-Sea	50 59	0 59 E.	—	W. Walsh, for H. T. Tubbs	G. S.	00
Llandinam, Montgomery ..	52 29	3 26 W.	500	John Owens	R.	—
Llandovery	51 59	3 48 „	217	J. Watkins	F.	00
✠ Llandudno	53 21	3 50 „	72	Wm. Little, for Town Council.	E. F. S.	99
London, Brixton	51 27	0 8 „	77	F. Gaster	T.	—
„ City	51 31	0 5 „	80	Messrs. De La Rue	S.	—
„ Hampstead ..	51 34	0 10 „	—	H. R. Beeton	C.	—
„ Pall Mall	51 30	0 7 „	—	Athenæum Club	C.	—
„ Westminster ..	51 30	0 8 „	76	The Staff of the Met. Office	C. G.	—
„ Westminister Training College.	51 30	0 8 „	—	H. A. Reatchlous, M.A. ..	S.	—
Londonderry	55 0	7 19 „	67	J. Conroy	F.	00
Loughborough	52 47	1 12 „	146	W. Berridge	T.	98
Lowestoft	52 29	1 44 E.	—	C. J. Heppell	G.	—
✠ Lowestoft	52 29	1 44 „	84	J. E. O'Connor, M.B., for the Corporation.	E.S.	99
Lytham	53 44	2 58 W.	21	J. C. Fisher, M.A., M.B., for the Corporation.	D. S.	00
Machrihanish..	55 35	5 45 „	16	J. Franklin Adams	G.	95
Maidenhead	51 30	0 43 „	99	G. H. Palmer	G.	99
Malin Head, Co. Donegal ..	55 23	7 24 „	230	A. Cox	T. C.	00
Mallaranny	53 55	9 40 „	119	Miss M. Kilsby	R.	—
Manchester, Oldham Rd. ..	53 29	2 13 „	190	J. Niven, M.A., M.B., for the Corporation.	D.	00
„ Whitworth Park	53 28	2 14 „	125	Prof. Schuster, F.R.S., D.Sc.	D.	00
✠ Marchmont	55 44	2 25 „	498	J. A. Wood	E. F. S.	98
Mareham-le-Fen	53 8	0 5 „	33	Mrs. G. L. Kime	R.	—

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		° ′	° ′				
M	Margate	51 24	1 24 E.	83	J. Stokes, J.P...	S.	00
	Markree Castle, Co. Sligo ..	54 11	8 27 W.	122	F. W. Henkel, B.A., for Col. Cooper.	D. F. S.	00
	Minard, Co. Kerry	52 7	10 8 „	—	Coastguard	W.	—
	Morpeth	55 13	1 41 „	324	W. H. Hogg	D. S.	00
	Mount Callan (Inagh), Co. Clare.	52 53	9 16 „	479	Lt.-Col. Tottenham ..	R.	98
	Nairn	57 36	3 52 „	82	Miss Penny	T.	00
	Newarp Lightship	52 45	1 53 E.	—	Light-keepers	W.	—
	Newcastle, Co. Wicklow ..	53 5	6 6 W.	256	B. H. Steede, M.D.	D.	00
	Newcastle-on-Tyne . ..	54 59	1 36 „	152	N. H. Martin, F.C.S. ..	G. S.	99
	Newchurch	51 41	2 48 „	—	C. Cullum	R.	—
	Newmarket-on-Fergus ..	52 46	8 53 „	—	W. W. FitzGerald	R.	98
	Newport, Monmouth ..	51 35	3 0 „	—	C. Cullum	R.	00
	Newton Hall	54 57	1 54 „	524	Rev. J. Seymour St. John	R.	—
	Newquay, Cornwall ..	50 25	5 4 „	250?	A. Hardwick, M.D., for the Town Council.	S.	00
	„ „ ..	50 25	5 5 „	—	Coastguard	W.	—
	Newton Reigny (Penrith)..	54 41	2 48 „	579	T. G. Benn	T. S.	00
	Northallerton	51 20	1 26 „	129	W. Stead, C.E.	R.	95
	North-West Lightship ..	53 31	3 31 „	—	Light-keepers	W.	—
M	Norwood	51 26	0 6 „	220	W. Marriott	E.	—
S	Ochtertyre	56 23	3 53 „	329	G. Croucher, for Sir P. K. Murray, Bt.	E. F.	99
	Omagh (Edenfel)	54 36	7 19 „	300	Col. Buchanan, C.B. ..	F.	00
	Oswaldkirk, Yorkshire ..	54 12	1 3 „	510	R. Thompson	S.	96
	Outer Dowsing Lightship	53 27	1 5 E.	—	Light-keepers	W.	—
	Owers Lightship	50 39	0 41 W.	—	„	W.	—
	Oxford	51 46	1 16 „	208	A. A. Rambaut, M.A. ..	T. S.	00
	Pant-y-reos	51 38	3 4 „	449	C. Cullum	R.	00
	Parkstone, Dorset	50 43	1 56 „	197	R. H. Barnes, B.A.	D.	00
	Penbedw (Mold)	53 12	3 11 „	659	H. W. Buddicom	C.	—
	Pennant Bay (Aberdour) ..	57 40	2 16 „	—	Coastguard	W.	—
	Pennington	50 46	1 35 „	—	Miss H. Fullerton	R.	—
	Penrhyn Quarry	53 10	4 6 „	—	H. P. Meares	R.	—
	Peper Harow	51 11	0 40 „	199	John Warner	R.	—
S	Pinmore (Girvan)	55 12	4 49 „	187	P. Donald, for Capt. Hamilton.	E.	99
	Plymouth, The Hoe.. ..	50 22	4 8 „	116	H. Victor Prigg, C.E., for the Corporation.	D. F. S.	00
S	Poltalloch	56 8	5 30 „	132	D. S. Melville, for Lord Malcolm.	E.	00
	Portland Bill	50 32	2 27 „	177	C. Smith	T.	00
	Portrush	55 13	6 40 „	—	Coastguard	W.	—
	Port Talbot	51 34	3 45 „	—	R. Milner, for Miss Talbot	S.	00
	Prestwich (Manchester) ..	53 32	2 17 „	320	T. R. H. Clunn, M.D. ..	D. F. S.	99
	Rauceby Hall	53 0	0 29 „	125	General M. Willson.. ..	G.	—
	Recess, Co. Galway	53 28	9 44 „	90	A. A. Smith	R.	—
	Rhyl	53 19	3 29 „	—	A. A. Goodall, for Dist. Council.	S.	—
	Ridgmont	52 1	0 36 „	291	H. M. Freear	D.	98
	Ridlington	52 37	0 45 „	522	W. W. Wortley	R.	—
	Roche's Point, Co. Cork ..	51 47	8 15 „	42	W. Kennedy	T.	00
	Rochford (Tenbury) ..	52 18	2 36 „	316	Rev. John Tomson	C. R.	96
S	Rosewell	55 51	3 7 „	690	R. B. Mitchell, M.D. ..	E.	99
	Rothamsted	51 48	0 22 „	368	Sir J. H. Gilbert and T. Wilson.	F. G. S.	99
S	Rothesay	55 50	5 4 „	115	J. Kay	E.	00
M	Rounton, Yorkshire ..	54 24	1 18 „	242	Sir I. L. Bell, Bart., F.R.S	E.	99
M	Rousdon, Devon	50 43	3 0 „	515	The late Sir C. E. Peek, Bart., M.A...	E.	00
	Roxborough, Co. Limerick	52 35	8 36 „	111	A. W. Shaw	R.	95
	Royal Sovereign Lightship	50 43	0 27 E.	—	Light-keepers	W.	—
	Rugby	52 22	1 15 W.	379	St. J. B. Wynne Willson, M.A.	G.	98
	St. Ann's Head, Pembroke	51 41	5 30 „	150	G. H. Dunsford	T S. W.	00
	St. Aubin's, Jersey	49 12	2 11 „	25	J. Fisher	T.	00

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St. David's, Pembrokeshire	51	53	5	16	W.	215	W. P. Propert, LL.D. ..	D.	00
St. Helen's, Lancashire ..	53	28	2	45	„	151	F. Drew Harris, M.D., for the Corporation.	G.	00
St. Heliers, Jersey	49	11	2	6	„	—	Signal Officer, Fort Regent	S.	00
St. Leonard's	50	51	0	33	E.	178	H. Colborne, M.R.C.S., for the Corporation.	D. F.	00
„ West Marina	50	51	0	32	„	—	T. Eldridge, for the Corporation.	G.	00
St. Peter Port, Guernsey ..	49	52	2	32	W.	223	F. E. Carey, M.D.	S.	00
Salcombe, Devon	50	14	3	46	„	—	Coastguard	W.	—
Sandgate, Kent	51	4	1	9	E.	56	A Robert Bowles, C.E. ..	R.	00
Scarborough	54	18	0	24	W.	219	W. W. Larkin, for the Corporation.	D. F. S.	00
Scarborough	54	17	0	23	„	..	Coastguard	W.	—
Schull	51	53	9	32	„	—	„	G.	00
Scilly Islands, St. Mary's ..	49	56	6	18	„	65	A. Hicks	R.S.T. W.C.	00
Seafield, Co. Clare	52	48	9	30	„	—	Coastguard	W.	—
Seaham Harbour	54	50	1	19	„	148	G. H. Aird	D.	00
Seven Stones Lightship ..	50	4	6	5	„	—	Light-keepers	W.	—
Shaftesbury	51	1	2	13	„	722	Miss L. H. Harris	F.	00
Shambles Lightship ..	50	31	2	20	„	—	Light-keepers	W.	—
Sheffield, Weston Park ..	53	23	1	29	„	439	E. Howarth, F.R.A.S. ..	D. S.	00
„ Attercliffe.. ..	53	24	1	26	„	—	J. Robertson, M.D., B.Sc., for the Corporation.	S.	—
Sheephaven (Dunfanaghy)	55	11	7	58	„	—	Coastguard	W.	—
Shields, North..	55	0	1	27	„	00	W. B. Clark	T.	00
Shields, North, High Lighthouse.	55	0	1	27	„	—	T. Robson	B.	00
Shipwash Lightship ..	52	2	1	38	E.	—	Light-keepers	W.	—
Skipton	53	58	2	9	W.	667	W. Farrer	G.	00
Solway Lightship	54	48	3	32	„	—	Light-keepers	W.	—
Southampton	50	55	1	24	„	78	J. T. Cook, for Dir. Gen. of Ordnance Survey.	D. F. S.	00
Southport	53	39	2	59	„	57	J. Baxendell, for the Corporation.	S.	97
South Rock Lightship ..	54	25	5	22	„	—	Light-keepers	W.	—
Spiddal, Co. Galway ..	53	15	9	17	„	—	Coastguard	G.	00
Spurn Head	53	34	0	7	E.	26	A. S. Badcock	T.	00
Spurn Lightship	53	34	0	13	„	—	Light-keepers	W.	—
Stokesay (Craven Arms) ..	52	26	2	52	W.	370	Rev. W. La Touche, M.A. ..	D.	00
Stonyhurst College	53	51	2	29	„	375	Rev. W. Sidgreaves ..	A. D. F.	00
Stornoway	58	11	6	22	„	30	J. Mackenzie	T. S. C.	00
„	58	11	6	22	„	—	Coastguard	W.	—
Stranraer	54	54	5	2	„	—	„	G.	—
Strathpeffer Spa, N.B. ..	57	37	4	28	„	253	J. Tregellas Fox, M.D. ..	D. S.	00
Sumburgh Head(Shetlands)	59	51	1	17	„	126	Rev. W. Brand	T. C.	00
Sunderland	54	54	1	23	„	—	Coastguard	W	—
Swarraton	51	8	1	11	„	—	Rev. W. L. W. Eyre, M.A.	F.	00
Symbister, Shetlands ..	60	14	1	25	„	—	J. S. Nicolson	G.	—
Syston, Leicester	52	43	1	5		178	S. K. Daniels	R.	00
Tealby, Lincolnshire ..	53	24	0	16		251	Rev. S. Lewin, B.A. ..	D.	00
Teelin, Co. Donegal	54	38	8	39	„	—	Coastguard	W.	—
Temple Bruer, Lincolnshire	53	4	0	30	„	—	Miss G. Morley	R.	00
Tenby	51	41	4	42	„	79	R. J. Truscott, for the Corporation.	S.	00
Thurcaston (Leicester) ..	52	42	1	10	„	253	Rev T. A. Preston, M.A. ..	S.	00
Torquay..	50	28	3	31	„	236	A. Chandler, for the Corporation	S.	00
Totland Bay, Isle of Wight	[illegible]		1	33	„	84	J Dover, M.A.	G.	00
Union Hall, Co. Cork ..	51	33	9	8	„	—	Coastguard	G.	00
Uzon (Montrose)	56	40	2	28	„	—	Coastguard	W.	—
Valencia Observatory, Cahirciveen.	51	56	10	15	„	[illegible]	J. E. Cullum	A. T. C.	00
„ Island, Glanleam	51	56	10	20	„	—	Miss R. FitzGerald.. ..	R.	—
„ „ Knightstown	51	56	10	20	„	—	Coastguard	G	—
Ventnor	50	36	1	13	„	80	Miss M. Gibson	S.	97

Station.	Lat.	Long.	Height in feet above M.S.L.	Observer.	Nature of Information supplied	Year of last Inspection.
Wakefield	53 41	1 30 W.	96	A. Clyde	E.	99
Waterford	52 16	7 7 „	—	Harbour Authorities	C.	—
Watergate (Emsworth)	50 56	0 55 „	236	W. M. Christy	R. S.	99
Watford	51 39	0 24 „	253?	G. E. Elland	R.	—
Wealdstone	51 37	0 20 „	179	G. E. Eland	R.	—
Wessington Court (Woolhope).	52 1	2 35 „	—	S. Lomas, for Miss L. Grafton.	D.	00
Westbourne, Sussex	50 52	0 55 „	30	Rev. L. B. Birkett	S.	99
Westray, Orkney	59 17	3 0 „	—	Capt. J. Hewison	G.	—
Whitchurch, Devon	50 33	4 6 „	593	E. E. Glyde	E.	98
Wick	58 27	3 6 „	80	J. Sinclair	T.	00
„	58 27	3 6 „	—	Coastguard	W.	—
Wolfelee	55 23	2 39 „	587	W. Gordon	E.	98
Woolacombe, Devon	51 10	4 12 „	59	E. Henshall, C.E.	D.	98
Worksop	53 22	1 5 „	56	H. Mellish	S.	96
Worthing	50 49	0 22 „	38	C. Kelly, M.D., for the Corporation.	S.	99
Yarmouth, Norfolk	52 37	1 43 E.	10	G. T. Watson	B. T. C.	00
Yarmouth, Isle of Wight	50 42	1 29 W.	—	Coastguard	G.	—
Ynis-y-bro (Newport)	51 38	3 3 „	115	C. Cullum	R.	00
York, The Museum	53 57	1 5 „	56	H. M. Platnauer, B.Sc.	D.	98
„ Bootham	53 57	1 5 „	105	A. G. Pichard	S.	96

In addition to those already mentioned, reports are received daily from the following Continental Stations.

Station.	Authority	Station.	Authority.
Haparanda	Meteorological Office, Stockholm.	†The Helder	Bureau Centra Météorologique, Paris.
Hernösand		Brussels	
†Stockholm		Cape Gris Nez	
Wisby		†Brest (St. Mathieu)	
Karlstad		Lorient (Ile de Groix)	
Bodö	Meteorological Institute, Christiania.	*†Rochefort (Ile d'Aix)	
†Christiansund		†Biarritz	
*†Skudesnaes		†Paris	
Færder		Belfort	
		Lyons	
		Nice	
†The Scaw	Meteorological Institute, Copenhagen.	Perpignan	
Fanö		Berlin	Cent. Met. Inst of Germany.
Cuxhaven	Deutsche Seewarte, Hamburg.	Frankfort	
		Munich	
		Corunna	Observatory, Lisbon.
		†Lisbon	
		Azores (P. Delgada)	

Note—The stations marked with an asterisk (*) report also at 2h. p.m., and those with dagger (†) at 6h. p.m.; Lisbon reports at 4h. p.m. instead of 6h. p.m

The Helder does not send reports at 6 p.m. on Sundays.

LIST OF BRITISH STATIONS ARRANGED UNDER COUNTIES.

County.	Station.	County.	Station.
England :—		England—*cont.*	
Bedford... ...	Aspley Guise.	Kent	Kearsney.
	Ridgmont.		Littlestone-on-Sea.
Berkshire ...	Maidenhead.		Margate.
Buckingham ...	—		Sandgate.
Cambridge ...	Cambridge.	Lancashire ...	Blackpool.
Cheshire ...	Bidston.		Bolton.
	Chester, Hawarden Bridge.		Darwen.
			Fleetwood.
	Hoylake.		Lytham.
Cornwall ...	Falmouth.		Manchester.
	Newquay.		Do. Whitworth Park.
	Scilly.		
Cumberland ...	Aspatria.		Prestwich.
	Newton Reigny.		St. Helens.
Derby	Buxton.		Southport
	Chatsworth.		Stonyhurst.
Devon	Arlington.	Leicester ...	Belvoir Castle.
	Cullompton.		Loughborough.
	Plymouth.		Syston.
	Rousdon.		Thurcaston.
	Salcombe.	Lincoln	Fulbeck.
	Torquay.		Mareham-le-Fen.
	Whitchurch.		Rauceby.
	Woolacombe.		Tealby.
Dorset	Parkstone.		Temple Bruer.
	Portland Bill.	Middlesex ...	London :
	Shaftesbury.		City.
Durham ...	Durham.		Hampstead.
	Seaham.		Pall Mall.
	Sunderland.		Westminster.
Essex	Clacton-on-Sea.		Wealdstone.
Gloucester ...	Cheltenham.	Monmouth ...	Newchurch.
	Cirencester.		Newport.
	Clifton.		Pant-y-reos.
	Dursley.		Ynis-y-bro.
	Hidcote.	Norfolk... ...	East Dereham.
Hampshire ...	Bournemouth.		Geldeston.
	Haslar.		Hillington.
	Pennington.		Yarmouth.
	Southampton.	Northampton ...	Colly Weston.
	Swarraton.	Northumberland	Alnwick Castle.
	Totland Bay.		Morpeth.
	Ventnor.		Newcastle-on-Tyne.
	Yarmouth.		
Hereford ...	Hereford.		Newton Hall.
	Wessington Court.		North Shields.
Hertford ..	Bennington.	Nottingham ...	Hesley Hall.
	Berkhamsted.		Worksop.
	Rothamsted.	Oxford	Churchill.
	Watford.		Oxford.
Huntingdon ...	—	Rutland ..	Ketton.
Kent	Broadstairs.		Ridlington.
	Chatham.	Shropshire ...	Stokesay.
	Dover.	Somerset ...	—
	Dungeness.	Stafford... ...	Cheadle.

County.	Station.
England—*cont.*	
Suffolk	Felixstowe.
	Gorleston.
	Hollesley Bay.
	Lowestoft.
Surrey	Bramley.
	Brixton.
	Cooper's Hill.
	Cranleigh.
	Kew.
	Norwood.
	Peper Harow.
Sussex	Bexhill.
	Bognor.
	Brighton.
	Cuckfield.
	Eastbourne.
	Forest Row.
	Hastings.
	Do. Water-works.
	St. Leonards.
	Do. West Marina.
	Watergate Park.
	Westbourne.
	Worthing.
Warwick ...	Edgbaston.
	Rugby.
Westmoreland ...	—
Wiltshire ...	—
Worcester ...	Rochford.
Yorkshire ..	Ampleforth.
	Aysgarth.
	Northallerton.
	Oswaldkirk.
	Rounton.
	Scarborough.
	Sheffield.
	Do. Attercliffe.
	Skipton.
	Spurn Head.
	Wakefield.
	York.
Wales :—	
Anglesey ...	Holyhead.
Brecknock ...	—
Cardigan ..	—
Carmarthen ...	Llandovery.
Carnarvon ...	Llandudno.
	Penrhyn Quarry.
	Bettws-y-Coed.
Denbigh ...	Colwyn Bay.
Flint	Penbedw.
	Rhyl.
Glamorgan ...	Port Talbot.
Wales—*cont.*	
Merioneth ...	Aberdovey.
Montgomery ...	Churchstoke.
	Llandinam.
Pembroke ...	St. Ann's Head.
	St. David's.
	Tenby.
Radnor	Disserth.
Islands :—	
Isle of Man ...	Cronkbourne.
Jersey	St. Aubin's.
	St. Heliers.
Guernsey ...	St. Peter Port.
Scotland :—	
Aberdeen ...	Aberdeen.
	Braemar.
	Pennant Bay.
Argyll	Laudale.
	Machrihanish.
	Poltalloch.
Ayr	Ballantrae.
	Pinmore.
Banff	Gordon Castle.
Berwick ...	Burnmouth.
	Marchmont.
Bute	Lamlash.
	Rothesay.
Caithness ...	Wick.
Clackmannan ...	—
Cromarty ...	Cromarty.
	Strathpeffer Spa.
Dumbarton ...	—
Dumfries ...	—
Edinburgh ...	Edinburgh.
	Leith.
	Rosewell.
Elgin	—
Fife	Burntisland.
Forfar	Dundee.
	Lednathie.
	Uzon.
Haddington ...	—
Inverness ...	Ben Nevis.
	Fort Augustus.
	Fort William.
Kincardine ...	Cove Bay.
Kinross	—
Kirkcudbright	Cargen.
	Glenlee.
Lanark	Glasgow.
Linlithgow ...	—
Nairn	Nairn.
Orkney	Deerness.
	Kirkwall.
	Westray.

County.	Station.
Scotland—*cont.*	
Peebles	—
Perth	Forgandenny
	Ochtertyre.
Renfrew ...	—
Ross	Ardross Castle.
	Glencarron.
	Stornoway.
Roxburgh ...	Wolfelee.
Selkirk	—
Shetlands ...	Lerwick.
	Sumburgh Head.
	Symbister.
Stirling... ...	—
Sutherland ...	Dunrobin Castle.
	Lairg.
Wigton	Stranraer.
Ireland :—	
Antrim	Belfast.
	Glenarm.
	Portrush.
Armagh ...	Armagh.
Carlow	—
Cavan	—
Clare	Ennis.
	Ennistymon.
	Hurdlestown.
	Kilcredane.
	Lahinch.
	Liscanor.
	Mount Callan.
	Newmarket-on-Fergus.
	Seafield.
Cork	Baltimore.
	Crookhaven.
	Crosshaven.
	Doneraile.
	Roches Point.
	Schull.
	Union Hall.
Donegal ...	Malin Head.
	Sheep Haven.
Donegal ...	Teelin.
Down	Donaghadee.
Dublin	Dublin (City).
	Do. (Mountjoy Barracks.)
	Glasnevin.
	Killiney.
	Kingstown.
Fermanagh ...	—
Galway	Arran.
	Cleggan.
	Recess.
	Spiddal.
Kerry	Killarney.
	Minard.
	Valencia.
	Do. Glanleam.
	Do. Knightstown.
Kildare	—
Kilkenny ...	Kilkenny.
King's Co. ...	Birr Castle.
Leitrim	Carrigallen.
Limerick ...	Adare.
	Foynes.
	Limerick.
	Roxborough.
Londonderry ...	Londonderry.
Longford ...	—
Louth	—
Mayo	Ballyglass.
	Blacksod Point.
	Mallaranny.
Meath	—
Monaghan ...	—
Queen's Co. ...	—
Roscommon ...	—
Sligo	Markree Castle.
Tipperary ...	—
Tyrone	Lissan.
	Omagh.
Waterford ...	Waterford.
Westmeath ...	—
Wexford ...	—
Wicklow ...	Bray.
	Newcastle.

LIST OF DOCUMENTS received from FOREIGN AND COLONIAL LAND STATIONS during the year ending March 31st, 1901.

Place.	Observer.	Nature of Observations.
Antigua	K. McDonald...	Observations twice daily, 1900, March to June.
Bahamas (Abaco)	Lightkeepers...	Lighthouse Register, 1900, January to December.
„ (Cay Lobos)	„	„ „ „ „ „
„ (Cay Sal)	„	„ „ „ „ June.
„ (Inagua)	„	„ „ „ „ December.
„ (Nassau)	J. A. Kerr and R. W. D. Albury ...	Observations once daily, 1900, February to December; 1901, January, February.
„ (Watling Island) ...	Lightkeeper	Lighthouse Register, 1900, January to December.
Barbados	J. R. Bovell	Monthly Summary of Observations twice daily, 1900, March to December; 1901, January, February.
Beyrout (Lee Observatory) ...	R. S. Dugan	Observations twice daily, 1900, March to December; 1901, January, February.
Cape Pembroke(Falkland Islands)	G. K. Broom, Lightkeeper	Lighthouse Register, 1900. January to December.
Cape Spartel (Tangier)	E. C. Hathaway, Lloyd's Signalman.	Observations twice daily, 1900, March to December; 1901, January, February.
Colon, Isthmus of Panama ...	Rev. S. P. Hendrick	Observations twice daily, 1900, February to December; 1901, January.
Cyprus (Famagusta)	G. Eliades	Observations twice daily, 1900, January to December.
„ (Kyrenia)	P. Michaelides	„ „ „ „ „ „
„ (Larnaca)	V. E. Feneck and P. Nicopoulos ...	„ „ „ „ „ „
„ (Limassol)	Luigi Béraud and M. Theodorides	„ „ „ „ „ „
„ (Nicosia)	P. Nicopoulos and V. E. Feneck ...	„ „ „ „ „ „
„ (Papho)	E. A. Malliotis and M. Enotiades ...	„ „ „ „ „ „
Fort Rae	Captain H. P. Dawson, R.A. ...	Hourly observations from 1 September, 1882, to 31 August, 1883.

LIST OF DOCUMENTS received from FOREIGN AND COLONIAL LAND STATIONS during the year ending March 31st, 1901. *—continued.*

Place.	Observer.	Nature of Observations.
George Town (British Guiana)...	Robert Ward	Observations twice daily, 1900, March to September.
" " " " ...	" "	Daily record of sunshine, 1900, February to December; 1901, January, February.
Gibraltar	Sergeant J. Power and Staff Sergeant W. Tuson, Med. Staff Corps.	Observations twice daily, 1900, March to December; 1901, January, February.
Gold Coast (Aburi)	Assistant Colonial Surgeons ...	Observations twice daily, 1900, January to December; 1901, January.
" " (Accra)	" " " ...	" " " " " " " "
" " (Adda)	" " " ...	" " " " " " " "
" " (Axim)	" " " ...	" " " " " " " "
" " (Cape Coast Castle)	" " " ...	" " " " " " " "
" " (Gambaga)	" " " ...	" " " " " February, April to August.
" " (Kumasi)	" " " ...	" " " " " and February.
" " (Kwitta)	" " " ...	" " " " " to December; 1901, January.
Lagos	T. B. Wright...	" " " " February to December; 1901, January.
Majunga, Madagascar	Stratton C. Knott	" " " " January to December; 1901, January.
Port Natal...	D. I. Nolan	Barometer diagrams, 26 December, 1886, to 10 September, 1887.

St. Helena	A. L. C. Hands	Observations once daily, 1900, January to October.
„	„	Continuous record of wind (direction and velocity), 1900, January to December.
„ (James Town) ...	A. E. Broadway	Daily rainfall, 1900, January to December (except May).
„ (Mount Pleasant) ...	T. C. Barker	„ „ „ January to April.
Sierra Leone	Z. Grant	Observations twice daily, 1900, March to December; 1901, January, February.
Sombrero	J. A. Richardson and A. L. Richardson.	Lighthouse Register, 1899, October to December; 1900, January to September.
Teneriffe (Sitio del Pino) ...	A. F. Perry	Observations twice daily, 1900, February to December; 1901, January.
„ „ „ ...	„	Continuous record of pressure, 1899-1900.
„ „ „ ...	„	„ „ temperature, 1899-1900

APPENDIX III.

LIST of CAPTAINS and OFFICERS who have sent in Logs classed as "Excellent" during the year ending March 31, 1901. Figures are attached to the name of each observer to show the number of "Excellent" logs which he has supplied during the whole time of his co-operation with the Office.

Name of Captain or Officer.	Number of "Excellent" Logs.	Ship.
Angus, T. S.	23	S.S. China.
Bertie, J. L.	4	S.S. European.
Clarke, W. H.	5	S.S. Tauric.
Crewe, E.	8	S.S. Victoria.
Crowley, C.	13	Verajean.
Dawson, W. P., R.N.	6	H.M.S. Waterwitch.
De la Garde, P., R.N. (Assistant Paymaster).	6	H.M.S. Waterwitch.
Duguid, W.	4	S.S. Prome.
Dupen, P. P.	16	S.S. Jebba.
Holmes, W. B.	1	S.S. Matatua.
James. E. Gates, R.N.R. ...	3	Lynton.
Livett, H. W.	2	S.S. Ormuz.
McAllister, W.	3	S.S. Clan Ferguson.
Martyr. J. W. C	1	S.S. Montrose.
Millican, J. W.	19	S.S Loughrigg Holme.
Milner, W. H.	33	S.S. Tagus.
Mitchell, J.	2	S.S. Prome.
Mullan, F. C.	7	S.S. Reynolds.
Scott, G. P., F.R.Met.Soc. ...	18	Buckingham.
Simpson, A.	31	S.S. Moravian.
Squares De Carteret, W. G. ...	10	S.S. Minia.
Woolfall, A.	1	S.S. Amasis.

APPENDIX IV.

List of Meteorological Logs and Documents received from Ships.

Captain's Name.	Ship.	Voyage.	Year.	Officers who have assisted in keeping the Meteorological Log.
Adams, William ...	S.S. Diana	Davis Straits	1900	
Anderson, Wm. ...	Barque Loch Katrine	Adelaide and Melbourne	1900–1901	Alexander Connor, 2nd Officer.
Angus, T. S.	S.S. China	Bombay, viâ Suez	1900	R. C. Nicholl, A. R. Worthington, B. Elliot, 3rd, 4th, and 5th Officers.
" "	"	" "	1900	R. Kemp, R. Nicholl, G. Martell, 2nd, 4th, and 5th Officers.
" "	"	Sydney, viâ Suez	1900	P. C. Headlam, Supernumerary 2nd [illegible]
" "	"	" "	1900–1901	W [illegible] 3rd, 4th, and 5th Officers.
" "	"	" "	1900–1901	John G. Sutherland, R.N.R., A. O. Cooper, R.N.R., W. Jones and J. Bowman.
Archibald, Rupert, R.N.R.	R.M.S. Empress of China.	Hong Kong and Vancouver	1900	W. Jones, A. O. Cooper, R.N.R., W. B. Wilkinson, R.N.R., and F. Davison.
" " "	" " "	" " ."	1900–1901	
Barker, D. W., R.N.R...	Training Ship Worcester.	Off Greenhithe	1900	Cadets.
Bertie, J. L.	S.S. European ...	New Orleans	1900	J. Williams, H. G. Hay, T. Williams, 2nd, 3rd, and 4th Officers.
" "	" ...	New York	1900	W. J. Bryson, A. W. Melling, and H. G. Hay.
" "	" ...	"	1900	Do. do.
" "	" ...	New Orleans	1900	Do. do.
Chamberlin, W. ...	Ship Poseidon ...	Honolulu, Portland (Oregon)	1900	

LIST of METEOROLOGICAL LOGS and DOCUMENTS received from SHIPS—*continued.*

Captain's Name.	Ship.	Year.	Officers who have assisted in keeping the Meteorological Log.
Clarke, W. H.	S.S. Tauric .	1900	R. Learmouth, 2nd Officer, V. W. Hickson, R.N.R., 2nd Officer, W. McColl, 3rd Officer, M. B. Wilson, 3rd Officer, R. Hume and G Houlgrave, 4th Officers.
" "	" .	00–1901	V. W. Hickson, R.N.R, 2nd Officer, M. B. Wilson, J. L. Jones, H. C. Rowlands, 3rd Officers, G. Houlgrave, P. C. Laight, 4th Officers
Combe, Commander J. W., R.N.	H.M.S. Pengu	99–1900	Sub-Lieut. J. D. Nares, assisted by G. Hutchinson. H Britcher J. Snicer,
Constantine, T.	R.M.S. Nile .	1900	W
Corner, F. W., R.N.R. ...	Ship Macquar	99–1900	J.
Cox, S. G.	S.S. Rotherfiel	1898–99	W
Crewe, Edward ...	R.M.S. Victori	1900	E. C. Roberts, R.N.R., Chief Officer, C. G. Smith, R.N.R., 2nd Officer, C. E. Hudson, R.N.R., Supernumerary 2nd Officer, C. W. Clift, R.N , H. H. Mannering, R.N ar. and
" "	" .	1900	E. , , , ,
" "	" .	00–1901	E. C. Roberts, Chief Officer. C. G. Smith, R.N.R., 2nd Officer, W. F. Cossey, Supernumerary 2nd Officer, H. H. Mannering, 3rd Officer, S. C. Swaby, 4th Officer, C. H. Druce, 5th Officer.

Crowley, C.	Ship Verajean ...	Newcastle (N.S.W.), Portland (Oregon), and Cape Town.	1899–1900	W. C. Jackson, B. Westray, 1st and 2nd Mates.
„	„ ...	Table Bay and Newcastle (N.S.W.) ...	1900	Do. do.
Cust, Commander H. E. P., R.N.	H.M.S. Rambler ...	Simon's Bay	1900	Lieut. H. J. G. Lawrence, R.N.
Davies, Herbert ...	R.M.S. Don	West Indies	1899–1900	J. Gair, 3rd Officer.
„ „ ...	„	Colon	1900	F. A. Bilton, F. S. Hannon, G. G. Gibbard, 3rd, 4th, and 5th Officers.
„ „ ...	R.M.S. Orinoco ...	West Indies	1900	Do. do.
Dawson, W. P., R.N. ...	H.M.S. Waterwitch ...	Samsa, China Sea	1899	Philip de la Garde, Assistant Paymaster, and J. R. Bowering, A. King, P.O.'s 1st class, G. Britton, F. J. Canaway, P.O.'s 2nd class.
Dickinson, L. R. ...	R.M.S. Danube ...	East Coast of South America	1899–1900	H. N. Lewis, 3rd Officer, C. N. Young. 4th Officer, S. W. Farmer and W. D. McFarlane, 5th Officers.
„ „ ...	„ ...	„ „	1900	W. D. McFarlane, 5th Officer.
Docherty, Hugh ...	Barque Tinto Hill ...	San Francisco, Iquique, and Dunkirk ...	1899–1901	— Allen, Alex. Hall, 2nd Officers.
Duguid, Wm	S.S. Prome	Rangoon, viâ Suez	1900	
„ „ ...	„	„ „	1900	George Guthrie and Ralph Taylor, 2nd and 3rd Officers.
Dupen, P. P.	S.S. Jebba	West Coast of Africa	1900	S. E. Speakman and L. C. Bakewell, 1st and 2nd Officers.
„ „	„ ...	„ „	1900	Do. do.
„ „	„ ...	„ „	1900–1901	Do. do.
Evans, T. R.	Barque Conway Castle	Honolulu, Callao, and Taltal	1899–1901	
French, A. A. L. ...	S.S. Lumen	Philadelphia	1900	F. A. White, 1st Mate.
Gifford, H. C.	S.S. Amber	Gibraltar	1900	G. C. Hogg, D. P. Morrell, E. G. Enright, 1st, 2nd, and 3rd Officers.

LIST of METEOROLOGICAL LOGS and DOCUMENTS received from SHIPS—*continued.*

Captain's Name.	Ship.	Voyage.	Year.	Officers who have assisted in keeping the Meteorological Log.
Gifford, H. C.	S.S. Amber	West Coast of Africa, Lisbon, and Gibraltar	1900	G. Hogg, Chief Officer, D. P. Morrell, 2nd Officer, W. Mist, 3rd Officer, and E. G. Enright, Extra 3rd Officer.
Glegg, Robert	S.S. Macduff	China and Japan, viâ Suez...	1899–1900	James Elliot, C E. L. Gumley, George Ansted. 1st, 2nd. and 3rd Officers.
Griffin, E. J., R.N.R. ...	R.M.S. Briton ...	Cape Town	1899–1900	
" " " ...	" ...	"	1900–1901	F. G. Robinson, G. Hamilton, and P. Durkin. 3rd, 4th, and 5th Officers.
Hay, C. W.	R.M.S. Aorangi ...	Brisbane, Honolulu, and Vancouver ...	1899-1900	A. H. Reed and R. Bailey. 3rd and 4th Officers.
" "	" ...	" " " ...	1900	Wm. Bishop, 3rd Officer.
" "	R.M.S. Warrimoo ...	Sydney, Brisbane, Suva, Honolulu, and Victoria (B.C.).	1899	G. M. Hammon. A. H. Reed, and W. Ellis, 2nd, 3rd. and 4th Officers.
Hemming, F. A. ...	R.M.S. Miowera ...	Sydney, Vancouver, viâ Wellington, Honolulu, and Brisbane.	1898–1900	Messrs Sydney Pearson, 3rd Officer, Newbery, and
" " ...	" ...	Vancouver, Honolulu, Suva, and Sydney	1899	cer.
" " ...	" ...	Brisbane, Victoria (B.C.), viâ Honolulu...	1900	H. C. Hamand W. Macfarlane, R. Bailey, and A. W. Newbery.
Hepworth, M. W. Campbell, R.N.R.	R.M.S. Aorangi ...	Sydney, Brisbane, Suva, Honolulu, and Vancouver.	1899	S. Bayldon, and 4th Officers.
Holmes, W. B.	S.S. Matatua	Wellington, viâ Cape Good Hope. and Monte Video, viâ Cape Horn.	1900–1901	R. 2nd and 3rd Officers.
James, E. G., R.N.R. ...	Ship Lynton	San Francisco	.899–1900	A. Donaldson, Chief Officer, and G. H. Goldsbrough, Midshipman.
Kempson, C. H. ...	R.M.S. Ionic	Cape Town, Wellington, Rio Janeiro ...	1899–1900	Messrs. Wm. Jones & Lewis.

Livett, H. W.	R.M.S. Ormus ...	Sydney, viâ Suez	1900	P. N. Layton, H. R. Leeslie, J. Hills, A. V. Cowell, 1st, 2nd, 3rd, and 4th Officers.
Lockyer, H. R. C. ...	S.S. Hellopes... ...	Monte Video	1900-1901	J. Duncan, L. Page, — Kelly, 1st, 2nd, and 3rd Officers.
McAllister, Duncan ...	S.S. Bhamo	Batoum, Calcutta, viâ Suez	1899–1900	Thomas Richmond, 2nd Officer.
" " ...	"	" " "	1900	James Lvall. Thomas Richmond, and 1st, 2nd, and 3rd Officers.
" Wm. ...	S.S. Clan Ferguson ...	Madras, viâ Suez	1900	, 2nd Officer.
MacCormaig, A. R. C....	Ship Alcinous ...	Sydney and Astoria (Oregon)	1899-1900	James MacVicar, Mate.
McKay, H., R.N.R. ...	R.M.S. Lucania ...	New York	1900	E. H. Pratt and E. G. Giggle, Extra 2nd Officers.
Marshall, O. P., R.N.R.	R.M.S. Empress of India.	Hong Kong and Vancouver	1900	W. Davison, 2nd Officer, J. H. Carter, 4th Officer.
Martin, T. C.	Barque Loch Tay ...	Adelaide	1899–1900	G. Calcutt, 2nd Officer.
Martyr, J. W. C. ...	S.S. Montauk ...	Quebec and Las Palmas	1900	Thomas E. Musgrave.
" " ...	S.S. Montrose ...	Cape Town	1900–1901	F. W. Whitton, R.N.R.
Miller, A. T., R.N. ...	Training Ship Conway	Off Birkenhead	1900	Cadets.
Millican, J. W.... ...	S.S. Loughrigg Holme	Quebec, Vera Cruz, Galveston, Pictou, and Nova Scotia.	1899–1900	
Milner, W. H.	S.S. Tagus	Cape Town	1900	L. J. K. H. Tinney, 4th Officer.
Mitchell, George ...	S.S. California ...	Mediterranean Ports and New York ...	1900	John Samuel.
Mitchell, James ...	S.S. Prome	Rangoon, viâ Sues	1900	
" " ...	"	" "	1900	R. Taylor, H. Lyon, John Reid, 1st, 2nd, and 3rd Officers.
Monro, Lieut. and Commander C. E., R.N.	H.M.S. Dart ...	Australian Stations...	1900	Surgeon A. O. Bobardt, assisted by E. . Lloyd, C. Ball, and Officers.
Mortimer, S.	R.M.S. Aorangi ...	Brisbane, Honolulu, and Victoria (B.C.)	1899-1900	R. Bailey, 3rd and 4th Officers.
Moseley, F. J., R.N.R....	S.S. Goorkha... ...	Cape Town	1900	I. Grogan, I. Attwood, R.N.R., I. Haywood, S. C. Rogers, 1st, 2nd, 3rd, and 4th Officers.

LIST of METEOROLOGICAL LOGS and DOCUMENTS received from SHIPS—*continued.*

Captain's Name.	Ship.	Voyage.	Year.	Officers who have assisted in keeping the Meteorological Log.
Mullan, F. C., F.R.G.S.	S.S. Reynolds ...	Batoum, Colombo, and Batavia	1900	W. H. Davies, T. Harrison, and E. Hall.
" " "	" ...	Java, Algiers, viâ Suez, Philadelphia, and Marseilles.	1900	Do. do.
" " "	" ...	Marseilles, Black Sea Ports, and Hamburg.	1900	Do. do.
Nasbet, J. R., R.N.R. ...	S.S. Sabine Rickmers	China Sea	1899–1900	T. Powell, A. Dransfield, 1st and 2nd Officers.
Newton, F. S.	R.M.S. Don	West Indies	1900	C. N. Young, E. Clarke, and L. W. Morant, 3rd, 4th, and 5th Officers.
Nicholson, C., R.N.R. ...	R.M.S. Ormus ...	Sydney, viâ Suez	1900	P. N. Layton, R.N.R., H. R. Leslie, W. de M. Baynham, R.N.R., A. V. Cowell, R.N.R., 1st, 2nd, 3rd, and 4th Officers.
Neal, R. J.	S.S. Hellopes	Cape Town and Buenos Aires	1900	
"	" ...	Monte Video and Buenos Aires	1900	
Parker, W. J.	Barque Kinclune ...	East London and Otago	1899–1900	Edward Foley, 2nd Officer.
Pattman, R.	Ship Loch Torridon...	Adelaide	1899–1900	A. Evans, L. C. Taylor, Malcolm J. Comyn, 1st, 2nd, and 3rd Officers.
Phillips, J. D. S. ...	R.M.S. Aorangi ...	Brisbane, Honolulu, and Victoria (B.C.)	1899-1900	A. H. Reed and R. Bailey, 3rd and 4th Officers.
" " ...	R.M.S. Warrimoo ...	Brisbane, Honolulu, and Vancouver ...	1900	G Bayldon, S. Bayes 1st, 2nd, 3rd, and 4th Officers.
Potter, R. H.	Barque Alliance ...	Cape Town, Newcastle (N.S.W.), and Valparaiso.	1899–1900	R. O. Harris, Reginald Turnbull, 1st and 2nd Officers.
Pybus, H., R.N.R. ...	R.M.S. Empress of Japan.	Victoria (B.C.) and Hong Kong	1900	J. G Sutherland.

Reeves, I.	S.S. Australia ...	Sydney, viâ Su...	1900	S. A. Davidson, R.N.R., E. G. H. Brady, R.N.R., L. R. Gardiner, R.N.R.
"	" ...	" "	1900	E. G. H. Brady, R.N.R., Supernumerary 2nd Officer, L. R. Gardiner, R.N.R., 3rd Officer, E. Downes, R.N.R., 4th Officer.
"	" ...	" "	1900–1901	L. A. Davidson, R.N.R., 2nd Officer, D. Scratton, Supernumerary 2nd Officer, L. R. Gardiner, R.N.R., 3rd Officer.
Reynolds, R., R.N.R. ...	R.M.S. Norman ...	Cape Town	1899	C. E. Stuart, R.N.R., — Markiew, T. A. Jones, D. E. Easton, 1st, 2nd, 3rd, and 4th Officers.
Roberts, Robert ...	S.S. Cabenda ...	West Coast of Africa	1899–1900	
Rogers, B. H. ...	S.S. Othello	Bombay, viâ Suez, New York	1897–1900	
Rudge, Horace	R.M.S. Atrato ..	West Indies	1900–1901	Messrs. J. E. P. Matthews, Tinney, Farmer, and Owen.
" "	R.M.S. Para ...	"	1900	C. L. Coxwell and G. A Mackenzie.
Schlaman, Henry ...	S.S. Sophocles ...	Melbourne, viâ Cape Town	1900–1901	A. Thomson, H. Clark, and R. Harrison, 1st, 2nd, and 3rd Officers.
Scott, G. P.	Ship Buckingham ...	Calcutta	1900	W. Calvert, George Gibbons, 1st and 2nd Officers.
Seymour, F. H. ...	S.S. Britannia ...	Sydney, viâ Suez	1900	...cer, ...ke,
" " ...	" ...	" "	1900	...3rd ...E.
" " ...	" ...	" "	1900	...2nd ...cer, ...les,
Simpson, Alexander ...	S.S. Moravian ...	Melbourne, viâ Cape Town	1899–1900	5th Officer. H. W. Schleman, Chief Officer, J. A. Elrick, 2nd Officer, and D. M. Rose, Supernumerary 2nd Officer.

LIST of METEOROLOGICAL LOGS and DOCUMENTS received from SHIPS—*continued.*

Captain's Name.	Ship.	Voyage.	Year.	Officers who have assisted in keeping the Meteorological Log.
Simpson, Alexander ...	S.S. Moravian ...	Melbourne, Sydney, viâ Cape	1900	J. A. Ross,
Simpson, C. H., R.N. ...	H.M.S. Egeria ...	Vancouver	1900	
Squares de Carteret, W. G.	S.S. Minia	Halifax	1899–1900	James Adams, Chief Officer. E. Hewardine, Nav. Officer, I. E. Jeffries, 2nd Officer, H. Lee, 3rd Officer.
Tamplin, L. H. ...	S.S. El Dorado ...	Chinese Ports	1900	
Tod, J. C.	Barque Shakespeare...	Natal, Newcastle (N.S.W.), Iquique, Mauritius, and Sydney.	1898–1900	George Milner, F Large, and F. Hereford.
Trenaman, R. W. ...	S.S Romney ...	Monte Video	1900	A. Gittins.
Turner, A.C., R.N.R. ...	S.S. Britannia ...	Bombay, viâ Suez	1900	R. A. Browne, 2nd Officer.
Tyson, John	R.M.S. Moor ...	Cape Town	1900	G. M. Bette, H. B. , 1st, 2nd, 3rd, and 4th Officers.
,, ,, ...	,, ...	,, ...	1900	W. Morton Betts. John Kerbey, W. Hay- 1st, 2nd, 3rd,
Walker, H., R.N.R., ...	R.M.S. Campania ...	New York	1899–1900	— Hankinson, 2nd Officer, — Affolter, Ex. 2nd Officer, — Dyke, 3rd Officer, — Brown, 4th Officer.
Wilson, John, R.N.R. ...	S.S. Anchoria ...	,, ...	1900	John Duncan, 3rd Officer.

Wood, G. H. B.	**Barque Lutterworth**	**New Zealand ... ...**	**1899–1900**	**J. Renton and W. Starr, 1st and 2nd Officers.**
Woodward, E. A. ...	**Barque Cumbrian ...**	**Sydney (N.S.W.), Peru, and Dunkirk ...**	**1899–1900**	**J. A. Rae and S. Spearpoint, 1st and 2nd Officers.**
Woolfall, Alfred ...	**S.S. Amasis ... ...**	**Quebec and Alexandria ... ...**	**1900–1901**	
Worcester, W. D. G., R.N.R.	**S.S. India ... ...**	**Sydney, viâ Suez ... ...**	**1900**	**A. H. James, Chief Officer, C. W. Burleigh, 2nd Officer, E. M. Hussey-Cooper, 3rd Officer, A. D. Williamson, Supernumerary 3rd Officer, H. T. Williams, 4th Officer, H. A. Smith, 5th Officer.**
" " ...	**" ... ...**	**" " ... ...**	**1900**	**G. C. Holloway, A. H. James, C. W. Burleigh, E. M. H. Cooper, H. Williams, and A. Cameron.**
" " ...	**" ... ...**	**" " ... ...**	**1900–1901**	**A. H. James, R.N.R., Chief Officer, S. P. Berridge, 2nd Officer, A. D. Williamson, Supernumerary 2nd Officer, H. T. Williams, 3rd Officer, and C. W. Cartwright, 5th Officer.**

APPENDIX V.

INSTRUMENTS supplied to the Royal Navy.

Per Account.	Barometers.	Aneroids.	Thermometers.				Hydrometers.
			Ordinary.	Max.	Min.	Screens.	
April 1st, 1900, afloat ...	239	674	1,400	427	418	238	57
Issued since	119	249	498	108	108	40	—
	358	923	1,898	535	526	278	57
Returned since	97	176	435	87	83	16	—
April 1st, 1901, afloat ..	261	747	1,463	448	443	262	57

INSTRUMENTS supplied for use at Naval Stations.

April 1st, 1900, in use ...	75	83	249	33	55	10	11
Issued since	3	2	37	1	1	—	6
	78	85	286	34	56	10	17
Returned since	3	1	27	1	—	—	3
April 1st, 1901, in use ...	75	84	259	33	56	10	14

DISPOSITION of ADMIRALTY INSTRUMENTS on April 1st, 1900.

Afloat in Royal Navy ...	261	747	1,463	448	443	262	57
In use at stations	75	84	259	33	56	10	14
In store at M.O.	51	100	73	70	65	44	45
„ Chatham	6	16	70	28	27	11	12
„ Sheerness ...	5	18	38	14	14	11	6
„ Portsmouth ...	17	38	118	41	46	19	4
„ Devonport ...	17	36	130	45	47	20	2
„ Queenstown ...	2	4	3	3	4	—	—
„ Gibraltar... ...	2	—	9	3	3	—	4
„ Malta	11	16	41	12	8	1	6
„ Bombay	4	4	6	5	4	2	4
„ Halifax	4	4	19	4	1	2	8
„ Bermuda ...	3	7	9	4	5	2	—
„ Jamaica	3	4	13	—	1	1	3
„ Cape of Good Hope	2	2	20	5	2	2	4
„ Trincomalee ...	4	5	21	5	6	1	4
„ Hong Kong ...	9	11	18	15	14	9	18
„ Coquimbo ...	2	3	20	3	4	1	—
„ Sydney	2	—	—	4	6	2	16
„ Esquimalt ...	5	9	20	2	3	2	4
Total April 1st, 1901 ...	485	1,108	2,350	744	759	402	211
Lost, &c., since April 1st, 1900	—	2	212	14	19	11	8
Under repair, April 1st, 1901	26	—	—	3	—	—	—

APPENDIX VI.

INSTRUMENTS supplied to the Mercantile Marine.

Per Account.	Barometers.	Compasses.	Thermometers.				Hydrometers.
			Ordinary.	Max.	Min.	Screens.	
April 1st, 1900, afloat ...	103	—	653	—	—	98	363
Issued since	40	—	219	—	—	25	131
	143	—	872	—	—	123	494
Returned since	39	—	202	—	—	17	115
April 1st, 1901, afloat ...	104	—	670	—	—	106	379

INSTRUMENTS at Stations, viz., Telegraphic Reporting Stations, Observatories, Fishing Villages, &c.

April 1st, 1900, in use ...	313	1	283	59	66	56	10
Issued since	19	—	49	8	13	1	—
	332	1	332	67	79	57	10
Returned since	16	—	11	4	8	—	3
April 1st, 1901, in use ...	316*	1	321	63	71	57	7

DISPOSITION of INSTRUMENTS on April 1st, 1901.

In merchant ships	104	—	670	—	—	106	379
„ use at stations	316	1	321	63	71	57	7
„ store at M.O.	32	3	98	13	8	25	88
At Liverpool Agency ...	7	—	57	—	—	7	25
„ Glasgow „ ...	10	—	40	—	—	5	14
„ Dundee „ ...	5	—	20	—	—	3	20
„ Hull „ ...	3	—	16	—	—	3	10
„ Cardiff „ ...	8	—	31	—	—	4	31
„ Southampton „ ...	4	—	17	—	—	3	19
Total, April 1st, 1901 ...	489	4	1,270	76	79	213	593
Lost, &c., since April 1st, 1900	2	—	50	1	3	7	19
Under repair, April 1st, 1901	2	—	6	—	—	—	—

* Of these barometers, 226 are lent for use of seafaring communities at fishing villages and ports.

APPENDIX VII.

REPORT ON THE COMPARISON OF THE FORECAST ISSUED AT 8h. 30m. p.m., WITH THE WEATHER SUBSEQUENTLY EXPERIENCED, for the 12 months April 1900 to March 1901. The results are for the United Kingdom as a whole.

The letters used have the following signification :—

a=complete success.	c=partial failure.
b=partial (more than half) success.	d=total failure.

The checking has been conducted on the same system as that employed in previous years, *i.e.*, each forecast has been considered under the separate headings of "Wind" and "Weather," but the results of the 8.30 p.m. Forecasts only are here published.

The first column gives the percentage of success in "Wind," the second in "Weather," and the third the average of the two.

The Summary for the various districts is given at page 18.

Months.		Percentages. Wind.	Weather.	Average.	a + b.
April	a	40	57	49	77
	b	27	30	28	
	c	26	9	18	
	d	7	4	5	
May	a	61	66	64	86
	b	22	23	22	
	c	12	8	10	
	d	5	3	4	
June	a	57	65	61	86
	b	27	23	25	
	c	14	10	12	
	d	2	2	2	
July	a	50	56	53	83
	b	32	28	30	
	c	11	10	11	
	d	7	6	6	
August	a	54	65	60	85
	b	27	23	25	
	c	12	6	9	
	d	7	6	6	
September	a	54	68	61	85
	b	22	25	24	
	c	16	5	10	
	d	8	2	5	
October	a	48	69	59	86
	b	27	28	27	
	c	15	2	9	
	d	10	1	5	
November	a	40	64	52	84
	b	37	26	32	
	c	16	6	11	
	d	7	4	5	
December	a	36	67	52	85
	b	43	23	33	
	c	14	8	11	
	d	7	2	4	
January	a	52	59	56	80
	b	26	23	24	
	c	14	12	13	
	d	8	6	7	
February	a	54	65	60	86
	b	27	26	26	
	c	16	7	12	
	d	3	2	2	
March	a	54	69	62	88
	b	28	24	26	
	c	15	5	10	
	d	3	2	2	
The entire year	a	50	64	57	84
	b	29	25	27	
	c	15	7	11	
	d	6	4	5	

APPENDIX VIII.

Conspicuous Meteorological Occurrences in 1900.

The following were the more striking features in the weather of 1900, noticed in connexion with the issue of daily and weekly reports.

1. *Gales.*—These were unusually frequent, but with a few exceptions they were of little severity. The most important storms were :—

(*a.*) From South and South-East on February 15th ; severe in the North and East, and accompanied by heavy snow-storms.

(*b.*) A Westerly (South-West to North-West) gale on December 20th and 21st ; severe in the West and North.

(*c.*) A Westerly gale on December 28th ; severe in the West and South. On this occasion a mean hourly velocity of 75 miles (nominal*) or more was registered at four of the Anemometer Stations.

The Westerly to Northerly gale which prevailed on the English and Irish Coasts on August 3rd was of unusual strength for the summer-time.

The records of the Anemographic Stations in connexion with the Office have furnished instances in which an average velocity of 44 miles per hour for one hour was reached or exceeded during the year, as given in the following Table. An average velocity of 44 miles per hour is assumed to be equivalent to the estimated force, 9 of Beaufort's Scale.† The average velocity for the hour is taken from the records of the Robinson anemograph or the Dines anemograph at the stations from which the records are quoted ; the maximum rate in a gust is from Dines instruments which are installed at Holyhead and Scilly.

The exposure of the several anemometers is not uniform and, in some cases, not so good as could be wished.

The effect upon the record caused by an imperfect exposure of an anemometer may be either to unduly increase or decrease it, according to circumstances.‡

The absence of any record of high winds at a station must in some cases be attributed to the peculiarity of exposure rather than to the entire failure of high winds in the locality.

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* *See* Note on p. 83.
† *See* Quarterly Journal, Royal Meteorological Society, Vol. xxiii., p. 41.
‡ *See* Annual Report of the Office for 1897–98, p. 23.

NOTES on GALES for which a MEAN ACTUAL VELOCITY of not less than 44 MILES (60 miles nominal)* per hour was REGISTERED on the SELF-RECORDING ANEMOMETERS.

Date.	Station.	Duration of Severe Gale, 44 miles per hour, or above.	Wind Direction.	Maximum.		Remarks.
				Hourly Velocity.	Rate in a gust.	
Jan. 9	Deerness...	11.30 a.m. to 0.30 p.m.	W.	44	—	In each of these instances the centre of the disturbance followed a north-easterly course, at some distance to the northward of the British Isles, and the gales only became severe locally.
„ 18	Fleetwood	2.30 a.m. to 3.30 a.m.	W.	44	—	
„ 22, 23	Deerness...	10.30 p.m. to 0.30 a.m.	W.S.W. to W.	44	—	
„ 24	Scilly ...	11.30 a.m. to 1.30 p.m.	W.N.W.	47	60	
„ 27, 28	Scilly ...	11.30 a.m. to 2.30 p.m., 27th, and 8 a.m. to 7 p.m., 28th	W.N.W.	47	75	A very small gale. The depression England and to have travelled south-eastwards to the continent. These two were the only stations at which the force of a strong gale was registered.
			N.W. to N.E.	61	83	
	Yarmouth	7.30 to 8.30 p.m., 28th	N.E.	42	—	
Feb. 13, 14	Scilly ...	5.30 p.m. to 10.30 p.m.	N.N.E. to N.N.W.	49	66	The centre of the Channe 8 a.m., 14th
	Yarmouth	11.30 p.m. to 2.30 a.m.	E.N.E.	44	—	
„ 15, 16	Scilly ...	2.30 a.m. to 4.30 a.m., 15th ...	S.E.'ly	45	61	During the some severe at Scilly, in one of which a rate of 71 miles per hour was registered by the pressure-tube anemometer. The depression was a deep one, and travelled across the north of Ireland and past the west coast of Scotland.
	Yarmouth	3.30 p.m. to 8.30 p.m., 15th ...	S.E.	48	—	
	Deerness...	2.30 p.m., 15th, to 8.30 a.m., 16th	E.S.E.	64	—	
	Aberdeen	6.30 p.m., 15th, to 2.30 a.m., 16th	S.E.	45	—	

Feb. 20	Scilly ...	Between 5 & 6 a.m., & from 7 a.m. to 9 a.m.	W.N.W.	46	58	Although the barometer was very low, the gradients were not steep, and the force of a strong gale was reached only at the mouth of the Channel.
Mar. 12	Deerness...	1.30 p.m. to 4.30 p.m.	W.	45	—	In both these instances the depression centres passed well to the northward of Great Britain.
„ 15, 16	Deerness...	11.30 p.m. to 2.30 a.m.	N.N.W.	45	—	
„ 18	Kingstown	4.30 p.m. to 5.30 p.m.	E.S.E.	45	—	At Scilly on the afternoon of this day some severe squalls from west were recorded, in one of which a rate of 57 miles per hour was reached. The depression followed an erratic course, first to the south-eastward, and then recurving went to the northward, and later to the south-westward, disappearing finally off the mouth of the Channel.
Apr. 11	Valencia...	1.30 p.m. to 9.30 p.m.	W.S.W.	46	—	The strong wind here was due to the formation of a well-marked secondary depression over the north-west of England.
„ 13	Fleetwood	6.30 a.m. to 11.30 a.m.	W.S.W. to W.N.W.	48	—	At Holyhead a mean velocity of 44 miles per hour was reached during brief intervals from 4 a.m. to 7 a.m., the maximum rate being 63 miles per hour. The centre of the disturbance was then off the north east of Scotland.
June 25	Scilly ...	3.30 a.m. to 6.30 a.m.	W.	46	56	Due to a small but well marked depression which travelled in a south-easterly di the night.

* The nominal value is that derived from a standard Robinson anemometer by the use of the Factor 3. In the data given in these notes, the factors which give, as nearly as can be ascertained, the true velocities have been employed in each case.

Date.	Station.	Duration of Severe Gale, 44 miles per hour or above.	Wind Direction.	Maximum.		Remarks.
				Hourly Velocity.	Rate in a gust.	
July 6	Fleetwood	2.30 p.m. to 3.30 p.m.	W.N.W.	45	—	The gradients became locally steep, owing to the co-existence of a depression over the North Sea, and an anti cyclone to the south-west of England.
Aug. 3	Kingstown	6.30 a.m. to 7.30 a.m.	N.E.	45	—	At Kingstown, at 5.45 p.m., the wind backed suddenly from S. to N.E. At Holyhead at 9.30 a.m. it veered as and the to a e of over s. rom S.W. to W., with an increase of force from a "fresh" to a "strong" gale. At Holyhead at 3 p.m., it veered to S., and at 6 p.m. y from S. to N.W., the force increasing very rapidly from a light breeze to a strong gale. At Kingstown the wind *backed* from E. to N.W. The depression seems to have followed a very similar track to the last.
	Holyhead	10 a.m. to noon	N.N.W.	46	62	
„ 6	Scilly ...	0.45 p.m. to 4.30 p.m.	W.	51	71	
	Holyhead	6.40 p.m. to 9.0 p.m.	N.W.	45	58	
Nov. 6	Scilly ...	2.30 p.m. to midnight	N.W.	54	71	At Holyhead between midnight and 1 a.m., 7th, the wind increased from a calm to a fresh gale from N.W.

Dec. 5	Scilly ...	4.30 p.m. to 6.30 p.m.	W.	47	62	The centre of the depression first travelled south-eastwards from Ireland to the Cornish and Devon coasts, and then north-eastwards across central England.
„ 15	Deerness	5.30 p.m. to 7.30 p.m.	W.	45	—	
„ 20, 21	Valencia	4.30 p.m. to 6.30 p.m., 20th ...	S.W.	49	—	At Scilly and at Holyhead the wind was very gusty, and at the former station some of the squalls lasted
	Scilly ..	10.15 a.m. to 10.45 a.m., 20th ...	S.S.W.	44	62	
	Kingstown	0.30 p.m. to 1.30 p.m., 20th ...	N.N.W.	47	—	
	Holyhead	5 p.m., 2[illegible] ..., 21st ...	S.W'ly.	44	64	
	Shields ...	9.30 p.m[illegible]30 a.m., 21st	S.W.	46	—	
	Deerness	8.30 a.m[illegible]m., 21st ...	N.W.	49	—	
„ 27, 28	Valencia	11.30 a.m., 27th, to 9.30 a.m., 28th	S.S.E. to S. & W.N.W.	59	—	This was the most severe gale of the year, the force of the wind in
	Scilly ...	9.30 p.m., 27th, to 0.30 p.m., 28th	S.W. to W. & W.N.W.	62	90	
	Kingstown	9.30 a.m. to 3.30 p.m., 28th ...	N.E.	55	—	
	Holyhead	9.45 a.m. to 6.45 p.m., 28th ...	W.N.W.	57	75	
	Fleetwood	11.30 a.m. to 9.30 p.m., 28th ...	N.W.	64	—	across central Ireland and the northern counties of England. On our eastern coasts the force of the wind was not so great.

2 *Heavy Rains.*—The heaviest *summer* rains, accompanied in most instances by thunderstorms, occurred on—

(*a.*) July 12th in the North of England and was especially heavy in the West Riding of Yorkshire (at one station in Ilkley there was as much as 5·4 ins.)

(*b.*) July 20th in Eastern and Central England. In Northampton and the vicinity a severe hailstorm occurred on this day.

(*c.*) July 27th and 28th in Ireland, and especially in the South.

The heaviest *winter* rains were recorded between October 26th, 27th and on December 30th.

In the former case they occurred during the formation of a deep secondary depression over the north of England on October 26th, the disturbance afterwards moving away across the Southern part of the North Sea. The heaviest falls occurred over the counties of Durham and Northumberland, the amount for the 24 hours ending with the morning of October 27th, being over three inches in many places lying between Berwick and Durham, and as much as 3·7 inches at Alnwick Castle and Newcastle-on-Tyne.

This depression was so limited in area during its formation that the daily maps did not adequately represent it. The telegram from Shields on the following morning announcing a rainfall of over three inches in the 24 hours was supposed at first to be a telegraphic error.

The heavy rains of December 30th occurred during the advance along the South of England of a small secondary depression of growing intensity. More than two inches fell at many places in the Western and South Midland counties of England, and more than three inches in a narrow strip of country extending from Bristol and Chepstow to Coventry. The changes which took place during the development of this secondary are very strikingly represented in the records of the Falmouth Observatory which are reproduced in Plate I.

Repeated heavy rains occurred in the West of Scotland during the week ending December 15th, the total amount at Fort William being as much as 8·5 inches, or 92 per cent. of the average for the whole of December.

3.—*Snowstorms.*—The only snowstorms worthy of note occurred in February and on the following dates :—

February 2nd—In the South and East of England.

February 8th to 10th—Over the entire Kingdom.

February 13—In all the more Southern Districts.

February 15th—Over the entire northern half of the Kingdom (a very heavy fall accompanied by a violent South-East gale and causing much damage to the telegraph wires.)

Plate I.

FALMOUTH OBSERVATORY RECORDS.

Decr. 30th-31st 1900.

WIND

WIND
(Nomin.

1520. 8. 1801

Hno. Ltd Lith.

month rain set in in the [illegible],
concluding week it became general.

6. *Temperature.*—The *highest* temperature occurred at various times between July 19th and 25th, when the thermometer rose between 85° and 90° in many parts of England, to 92° in Lond

4. *Thunderstorms.*—These were unusually frequent, and were accompanied in many instances by exceedingly heavy falls of rain and hail. The heaviest and most general storms occurred on the following dates :—

July 12th, 16th and 20th.—In many parts of England.

July 27th and 28th.—In many parts both of England and Ireland.

August 2nd and 3rd.—At several of our Northern Stations.

August 5th and 6th.—In the North and North-West.

August 21st and 22nd—Chiefly in the West and North.

The thunderstorms of July 27th were accompanied in the Central and South-Eastern parts of England by barometrical changes of an unusually sudden character. The storms passed unexpectedly over England from the Bay of Biscay and falsified the forecasts of the Office. The records of a number of observations are represented in Plate II.

5. *Droughts.*—Very few actual Droughts were reported. The longest periods of dry weather occurred—

(*a.*) In *March* and over Eastern and Central England. At Oxford no rain fell between the 1st and 14th, while at Spurn Head there was only 0·03 inch between the 5th and 24th (20 days). In other parts of the Kingdom the earlier half of the month was dry, but a decided change occurred about the middle of the period.

(*b.*) In *April* in the Eastern and Southern parts of the Kingdom generally. At Spurn Head there was only 0·03 inch between April 17th and May 2nd, while at Jersey there was none between April 16th and 29th. At our North-Western and Northern Stations, the weather at the time was changeable, but the daily amounts of rain were mostly small.

(*c.*) In *July* and in the South of England. In London there was only 0·01 inch of rain between the 4th and 26th, while at Dungeness there was none between the 3rd and 26th. In other districts the weather was rather unsettled, with local thunder-rains of considerable weight.

(*d.*) In *September.*—This was the most general drought of the year, the earlier half of the month being very dry at all but our extreme Western and Northern Stations. At many places in the Central and Southern parts of England scarcely any rain fell between the 2nd and 24th, and at Oxford there was none at all between the 2nd and 25th. After the middle of the month rain set in in the West and North, and in the concluding week it became general.

6. *Temperature.*—The *highest* temperature occurred at various times between July 19th and 25th, when the thermometer rose to between 85° and 90° in many parts of England, to 92° in London

and at Hillington, and to 95° at Cambridge. In London and at Cambridge readings of 90° or more were recorded on four distinct days—a very unusual occurrence. In Ireland and Scotland the highest temperatures were registered, as a rule, on August 15th, when the thermometer rose to 80° and upwards in many places, and to 86° at Londonderry.

The *lowest* temperatures occurred between February 8th and 13th, when the thermometer fell below 15° at many Inland Stations in England and Ireland, and below 10° in many parts of Scotland. The lowest readings reported were :—(1) In England and Wales, 8° at Newton Reigny (Penrith) and 10° at Loughborough, Rothamsted and Llandovery ; (2) In Scotland, − 3° at Braemar, 1° at Lairg and 5° at Fort Augustus ; (3) In Ireland, 10° at Kilkenny Castle and 12° at Killarney.

In the two other winter months, January and December, there was a striking absence of severe frost.

APPENDIX IX.

REPORTS OF INSPECTIONS OF STATIONS WITH SELF-RECORDING INSTRUMENTS, 1900.

A.—OBSERVATORIES. (First Order Stations of the International Classification.)

Falmouth, October 12th-15th.—The instruments at this observatory were all in excellent order and the photography was very good.

The anemometer was taken down and cleaned, the different bearings afterwards being lubricated with fresh sperm oil.

The cups and stays were quite sound, but two blades of the fans were found loose, these were resoldered and made secure. The clock and recorder received due attention, and after re-mounting the instrument the orientation was tested and found correct. Next, the barograph and thermograph were examined and cleaned as usual, the dots shifted from the summer to the winter position, and the thermometers tested (*see* p. 113).

I had the rain gauge clock taken to pieces and cleaned, and then took rubbings of both the self-recording and spare funnels.

T. W. B.

Oxford, Radcliffe Observatory, August 29th-30th.—The self-recording meteorological instruments here were, as usual, in first class order. The barograph and thermograph were performing satisfactorily, and the photographic curves were very good.

The Robinson anemometer was dismounted, and the old oil—which was rather dirty—was removed and new sperm added. All parts were cleaned, and the orientation was tested and found correct.

The Beckley rain gauge was examined as usual. The thermometers in the thermograph and the Stevenson screens were compared with Kew Standard, No. 720 (*see* p. 113).

E. G. C.

Stonyhurst, August 10th-11th.—The self-recording meteorological instruments at this observatory appeared to be working in a satisfactory manner.

The anemometer was dismounted and cleaned. The lubricant—sperm and paraffin—was fluid, but dirty, and had dried up in the cup on the head of the velocity shaft.

I think it would be well if the Office could send a supply of their sperm oil for use here. The blades of the windmill governors are beginning to wear away.

The fusee spring clock driving the cylinder required attention, oiling, &c., which was done. Orientation was good. Both barograph and thermograph were cleaned, and a stouter winding cord was fitted to the clock barrel of latter instrument, the one in use being rather slight.

Lenses and condensers were examined, and the barometer tube cleaned.

The photographic traces of the dry bulb zero line were somewhat faint and too fine. I corrected this, and gave some suggestions for the improvement of the curves, but I am afraid that the irregular gas pressure will always cause variations in the intensity of the traces. The clock of the Beckley rain gauge, No. 3, was cleaned, and a new clock-line fitted, and a new pen and supply of ink was furnished for this instrument.

The thermometers were compared with the Kew Standard thermometer, No. 720, at 57° F., and the corrections required are given in the table (p. 113).

E. G. C.

SCOTLAND.

Aberdeen, October 2nd-4th.—All the instruments at this observatory were working very satisfactorily, with the exception of the barograph clock. Owing to the wear of the pallets of the escapement, the beat had become very weak and the arc of vibration of the pendulum extremely small so that there was danger of its stopping.

The clock was put in the hands of a local watch maker, who altered the position of the pallets by means of a brass washer and rebushed some of the pinion holes, which greatly improved its action. Professor Niven stated that the thermograph clock had been similarly treated in the early part of the year.

I cleaned the lenses and other parts of both barograph and thermograph, after which the standard thermometers were tested (*see* p. 113).

The anemograph was in excellent order, the bearings of all parts being well oiled and in good condition. After cleaning and replenishing the bearings with fresh sperm oil the orientation was examined and found correct.

On examining the rain gauge I found the clock in such capital order that it did not require any special cleaning. Rubbings of both the self-recording and spare gauges were obtained in the usual way.

T. W. B.

Fort William, September 22nd-24th.—The dry thermograph tube was broken on July 15th, and Mr. Rankin reported that he had fitted up the spare tube on the 18th and both were run as dry bulbs, but shortly after Dr. Buchan's visit on August 16th the new tube was made a wet bulb as well as the Standard thermometer, No. 671.

My attention was called to the photographic sheets, which were a good deal discoloured by stray light, and also to the traces which were liable to overlap owing to a difference in the range of the scales of the two thermograph tubes. I took down the new tube and reblackened the stem to block out the stray light. After performing this operation we decided to run the new tube as a dry bulb, and also the Standard thermometer, No. 671, was again made a dry bulb. A new scale will have to be constructed for the new thermometer as soon as a sufficient number of eye-observations have been taken.

The zero lines were changed from the summer to the winter position, and the various thermometers were tested (*see* p. 113).

I took the barograph clock to pieces and cleaned it as well as the other parts of the instrument; also the rain gauge clock was cleaned and a new line fitted to the weight.

The pipe leading from the funnel to the receiver was found cracked, a new piece of piping was substituted, and afterwards rubbings were taken of both the self-recording and spare funnels.

T. W. B.

Glasgow, September 19th-21st.—Professor Becker drew my attention to the unsafe condition of the metal frame which supports the thermograph tubes as well as the dry and wet Standard thermometers. This was discovered shortly before my visit, and had been temporarily secured by means of strong wire. I had all the thermometers dismounted, and on examining the supporting frame found that the principal brass tube had split throughout its entire length and in one place was cracked transversely, indeed the brass had become quite rotten.

A new brass tube was fitted to the frame and all parts were made quite sound before the thermometers were remounted.

The zero values were changed from the summer to the winter position and the various thermometers tested (*see* p. 113). Afterwards the usual cleaning of the clock and other parts of the thermograph was duly performed.

The barograph was also examined and cleaned, and the sun recorder was found in correct adjustment. I had the anemometer dismounted and cleaned all parts, the bearings being lubricated with fresh sperm oil as supplied by the office. The orientation was tested and the sheet containing the result was sent in with this report.

On examining the rain gauge it was discovered that the bottom of the Stonyhurst discharger had become unsoldered and in consequence was rendered useless. This I got repaired and left the instrument working quite satisfactorily. The clock was oiled and a rubbing taken of the funnel.

T. W. B

Ireland.

Valencia, Co. Kerry, August 21st-23rd.—The weather at the time of my visit to this observatory was rather rough and unsettled, but I managed to dismount the anemometer. The sperm oil in the direction-roller sink was rather thick and dirty, and had "caked" on the rollers. All parts were soaked in paraffin, cleaned, and fresh sperm added. The cups, stays, fans, &c., are in a satisfactory condition, and the exterior portion of the instrument has been recently painted. The fusee spring clock driving the cylinder required cleaning and oiling, which was done, and the pencils, &c., received attention. Orientation was good.

The barograph and thermograph were working in a satisfactory manner, and the photographic curves were good; but as it was doubtful if the clock cords would last much longer, I fitted new lines and cleaned both clocks, also the lenses and condensers. The Beckly rain gauge, No. 8, was dismounted and cleaned. A new pen and supply of ink was furnished to Mr. Cullum, as well as a new pen for the "Richard" barograph.

The corrections to the thermometers are given in the table (p. 113).

E. G. C.

B.—Anemograph Stations.

England and Wales.

Alnwick Castle, October 6th.—The anemometer was going satisfactorily, and is regularly attended to and oiled by the resident mechanic.

The exposed parts of the instrument were examined and all the bearings found to be well lubricated with sperm oil. I also attended to the recorder and clock, and tested the orientation; the sheet containing the result was forwarded with this report. From an inspection of the curves the tracings sent in to the office appear to be carefully made, excepting that in the original sheets the pencil marks slightly overlap the printed scale both top and bottom, but this is not shown in the tracings.

T. W. B.

Fleetwood, August 13th-14th.—The exterior portion of the Robinson anemograph at this station has not been taken down since 1898, and considering this, the instrument was in very fair order. It was taken down, examined, and cleaned. The sperm oil in the direction-roller sink was fluid, but very dirty, and there was no oil in the cup on velocity shaft, but the head of the screw plug for the feeding hole was quite burred off, and the shaft had not been oiled for some little time. I had this remedied and a new slot cut.

The endless worm on the direction-fan spindle is much worn, causing considerable side-shake, and both of the lower "lignum vitæ" steps are cracked. The direction is inclined to be a trifle sluggish.

The clock, pencils, &c., were cleaned and oiled. I found that the plate and nut holding the direction mitre wheel was loose, and could be lifted up; this was put right.

The orientation was satisfactory.

E. G. C

Holyhead, September 25th.—I visited the instruments with Mr. Cotton, and gave instructions for some small repairs and for repainting the notice board. There seemed to be too much play in the collar of the Robinson anemometer. Mr. Cotton will apply to the Board of Trade for the painting of the stage which was erected at the expense of the Board.

W. N. S.

Plymouth, September 3rd.—This anemometer had not been dismounted since it was first set up, and Mr. Prigg asked me to examine it.

I was informed that the records of this instrument, as well as those of the other self-recording instruments at the station, would willingly be placed at the service of the Office should it at any time desire them.

R. H. C.

Scilly, August 28th.—Both the Robinson and the pressure-tube anemometers were dismounted and thoroughly cleaned. The former was in good order, except that the parts which are not readily accessible required cleaning, but there were nowhere any signs of undue wear.

The pressure-tube was working well, but I found that some of the soldered joints were becoming corroded, although as yet the evil has not progressed very far.

Both instruments needed repainting. When restarted after cleaning they both worked very satisfactorily.

R. H. C.

Shields, North, October 8th-9th.—Here the recorder and clock greatly needed cleaning, as the dust and dirt which was shaken down upon the instrument during the gale in June last had got into the clutches of the pencils as well as the wheels gearing into the clock. The shafting really passes down a disused chimney, and in order to protect the recording apparatus from any débris, two boards were fitted up when the instrument was first erected, but evidently one of them had got displaced and so allowed the dust to come through on to the instrument. I pointed this out to Captain Robson, who is a comparatively new observer, and had the board replaced in position in his presence.

The external parts of the anemometer were dismounted and cleaned and all bearings supplied with fresh sperm oil, after which the orientation was examined and found correct.

Some little difficulty was experienced in getting the clock into proper beat and it stopped during the night. The next day further attention was given to it, and on the following morning Captain Robson informed me that it had gone all right.

T. W. B.

Yarmouth, August 27th-28th.—The examination and cleaning of the anemometer here was carried out under difficult conditions, the wind blowing about 40 miles an hour, but with assistance I was able to dismount and overhaul it. The instrument was in good order and well lubricated, and the oil was in a most satisfactory state, both as regards colour and fluidity.

All parts were cleaned, and lubricated with fresh sperm.

The orientation was good.

The support of the stand to which attention was drawn in my last report has been temporarily repaired, and as the heart of the wood seems sound it may stand for some time longer.

I devoted considerable time to the improvement of the velocity pencil markings, and I think that the traces now will be decidedly better, and also mark to the printed scale, but as I have before reported it is an old type of recorder and difficult to do much with.

E. G. C.

Scotland.

Deerness, September 27th-28th.—At the time of my visit the weather turned out very wet and stormy, and in consequence I was unable to entirely dismount the external parts of the anemometer. The cups, however, were taken off and the velocity shaft, which had broken down in the Spring, was found to have been carefully and neatly repaired by the local smith. The direction shafting was slightly rubbing against the woodwork inside the hut, this was cut away so as to leave the shaft quite free.

The action of the velocity pencil is not very satisfactory, and the trace is bent backwards at the end of each revolution of the pencil, thus showing that the spiral is not true.

Mr. Spence also reports that the trace at times is serrated. On a previous inspection the screw thread of the spindle supporting the pencil was accidentally broken, and the nut is only held by a couple of threads. Should the traces become worse I would suggest that the recording portion of the instrument, including the cylinder, but not the clock, be sent to Mr. Munro for repair.

T. W. B.

Ireland.

Armagh, August 15th-16th.—The Robinson anemometer at this observatory is apparently regularly looked after and lubricated. It was taken down and all parts cleaned. The oil was in excellent order, clean and fluid; it was replaced with fresh sperm. There is nothing special to note, the instrument—generally speaking—being in good condition, although the fan-spindle worm is beginning to wear away.

The clock, recording pencils, &c., were cleaned and oiled. The velocity pencil rises at times above the plane of the paper in calms, but this cannot be corrected with the present spiral.

The orientation was good.

The rain gauge clock required attention.

E. G. C.

Dublin, Phœnix Park, August 16th-17th.—The anemometer here I found was well lubricated but wanted cleaning. It was all dismounted and overhauled.

The oil in the plunger or brake box was in a fairly satisfactory state, but that in the ball bearings for the direction plate was dirty and rather viscid. Fresh sperm was used for both, and all was left clean and in good order.

The clock seems to have been a little erratic of late—it certainly wanted cleaning; this was done and the pendulum-bob was slightly raised.

The orientation was satisfactory.

Greenwich mean time is now used here.

Corporal Blackmore has charge of the meteorological instruments, and seems to take considerable interest in them.

E. G. C.

C.—Sunshine Stations.

England and Wales.

Blackpool, October 20th.—The observer, Mr. H. Smith, of the Public Health Office, showed me the instrument and gave me all necessary information. It appears to be somewhat out of adjustment both for level and azimuth, and the lens seems rather deficient in burning power. Instructions should be sent for readjusting it.

W. N. S.

Bournemouth, September 13th.—The arrangements respecting observations here are in a transition state, and for the present no returns will be sent to us. The position of the recorder is unsatisfactory owing to trees.

R. H. C.

Cirencester, September 14th.—I found the recorder clean, in good focus, and firmly clamped in its place, which is on top of a wooden stand. The adjustment was not quite correct, and I altered it as far as I could without removing the clamping irons, which I deemed it unwise to attempt. I found the card correctly set in its place, and I think the instrument is carefully attended to.

J. A. C.

Cullompton, August 18th.—The sunshine recorder was in good adjustment. I called attention to a tree on the east-north-east, and also to one on the west-north-west, which required their tops to be cut off.

W. M.

Cullompton, September 5th.—The station has not been seen for the office before. The instrument is well placed, but growing trees to the west are likely to interfere presently with the record. The observations are most carefully made, and the station excellently represents the sunshine of the district.

R. H. C.

Eastbourne, November 14th.—This instrument is admirably placed, and I found it clean and in very good order. The card, however, was not in its right place by about fifteen minutes in time.

J. A. C.

Guernsey, September 10th.—The record is from a Jordan photographic recorder well placed on the roof of the house and on the highest part of St. Peter Port. The instrument was loose, and required to be made fast to prevent its getting out of adjustment. Dr. Carey expressed his willingness to send other climatological observations if desired to do so.

R. H. C.

Hastings, November 13th.—The recorder now stands on the top of a tower built for it on the house of Mr. Farnham, the Water Manager, where it has a very excellent exposure. The adjustment is very good, and the instrument is very carefully attended to.

The station possesses a second recorder, which is in position, but not in use.

It is the custom at this station to tabulate the sunshine for each hour of the day, and these hourly tabulations are, I was informed, at the service of the Office should they at any time be asked for.

J. A. C.

Jersey, St. Heliers, September 7th-8th.—A new recorder has recently been sent to this station, and it had not been accurately placed in position. The post on which it stands was strengthened and the adjustment then made good. The attention of the observer was called to some recent irregularities in returning the cards to the Office. I also inquired as to whether the amount of sunshine could be telegraphed to the Meteorological Office daily, and arranged with the Harbour Master as to the steps to be taken for the purpose.

R. H. C.

Littlestone-on-Sea, November 12th.—The recorder is admirably exposed on the top of a water tower which stands close to the sea front. With a possible exception, due to a turret which rises 3 feet above the recorder on the opposite side of the tower, the exposure is perfect.

I found the instrument standing on a stone slab, unfixed, and without any marks to indicate its correct position. The sphere, too, was not central in the bowl. With some little trouble I corrected this latter defect, and then, after carefully adjusting the instrument, I securely bedded it in Portland cement. I instructed the observer to keep a careful watch on the record as the winter solstice approached, and if he found the turret referred to above to interfere with the record to report the fact at once. The instrument was clean and the card properly in position.

J. A. C.

Margate, November 13th.—The instrument here is one of the "Universal" pattern, and it was badly out of adjustment. The exposure of the recorder leaves nothing to be desired.

R. H. C.

Newton Reigny, October 18th.—The recorder has a good exposure. Newton Reigny is two miles W.N.W. of Penrith; it is on the eastern slopes of the mass of the Cumbrian hills.

W. N. S.

Newquay, August 31st-September 1st.—The stand here was much decayed, and the recorder quite loose and not in proper adjustment. As there was some doubt whether the present observer could continue the observations, I tried to find another site for the instrument, but unsuccessfully. Eventually Mr. Pearce promised to make arrangements for the observations being continued at the present site, which has a perfect exposure, and I therefore repaired the stand and readjusted the instrument. I found considerable alteration of the pedestal was necessary to get the ball central in the bowl. Mr. Pearce will endeavour to get the observations taken over by the Town Council.

R. H. C.

Pembroke, St. Ann's Head, September 21st.—The recorder stands on a wooden post 5 feet 3 inches high, over grass, on the Head, which is 150 feet above the sea. From E.N.E. to W.N.W. through south the exposure is perfect, and to N.E. and N.W. there is nothing subtending an angle greater than about 3°. The instrument was clean, in good adjustment, and is, I believe, carefully attended to. It stands near the thermometer screen and about 200 yards from the light-house.

J. A. C.

Port Talbot, Margam Park, September 18th.—The recorder stands on a wooden post on the Castle Terrace where it has a very good exposure, the trees, of which there are many in the park, interfere but very slightly if at all with its indications. I found the small pedestal on which the ball rests was quite loose, and with considerable play, I accordingly dismounted the instrument, and succeeded in fixing the pedestal so that the ball was central in the bowl. I then replaced the instrument in exactly its old position on the wooden post. I think it likely the post will warp somewhat with changes of weather. The instrument appears to be very carefully attended to.

J. A. C.

Rousdon, August 20th.—The ball of the sunshine recorder was not quite in the centre of the frame. The ball weighed 3 lbs. Sir Cuthbert Peek has two other balls, one of which weighs 2 lbs. 15½ ozs. and the other 3 lbs. 1 oz. One is also slightly larger than the other, and denser in colour.

W. M.

Scarborough, September 7th.—I recommended that the recorder be moved to a new position where when put on a post it will have a very fair exposure, as the only obstructions, viz., houses on the east and south east make an angle of 5° or 6°.

W. M.

Southampton, September 15th.—The only point that called for remark in connexion with this recorder was that the yellowish tint of the lens appeared to me to be deeper than when I last saw it, an opinion which was shared by the observer. The glass was, however, perfectly clear and transparent, and yielded an excellent trace.

R. H. C.

Tenby, September 18th.—The recorder is placed on a wooden stand on the top of a tower 27 feet above the ground, and nearly 100 feet above the sea, with an exposure that may be termed perfect, except for a flag staff that may sometimes cut off a little sunshine. The instrument was out of adjustment for time, and slightly for latitude also. I dismounted it, therefore, and re-set it, so that the sun's image came exactly in the right

place. I expect, however, the stand will warp with changes of weather. The cards, both for past months and for the future, will be sent to the Office if desired, the Office in that case supplying the blank cards as usual. The observer promised to send up the weekly returns more promptly in future.

J. A. C.

Torquay, September 4th.—This instrument had not previously been seen on behalf of the Office. Its site is excellent, and the instrument now in use is a very good one. It is, however, proposed to remove the recorder to a more convenient, although in other respects less satisfactory, site on the pier. The present observer is Mr. F. March, M.P.S., and he appears to have taken up the work very zealously.

R. H. C.

Ireland.

Markree Castle, October 9th.—The sunshine recorder is not perfectly exposed, but the site is the best available; the instrument requires fixing. The trace was not running quite parallel to the edges of the card, probably on account of the instrument not being quite level. Mr. Henkel will see to the adjustment of the instrument.

W. N. S.

Report upon the Meteorological Instruments at the National Physical Laboratory.

The National Physical Laboratory,
December 21st, 1900.

Dear Sir,

I have pleasure in enclosing with this a report on the meteorological observations at the National Physical Laboratory (Kew Observatory), which Dr. Chree, Superintendent of the Observatory Department of the laboratory, has drawn up at my request.

I am, &c.,
R. T. Glazebrook,
Director.

The Secretary,
Meteorological Office.

The National Physical Laboratory,
December 20th, 1900.

Dear Mr. Shaw,

In accordance with your letter M.O. 1662, I asked Mr. Constable to make any notes that occurred to him, and enclose what he has written. I have also some remarks to add from myself.

Thermograph.—The frequent additions of water that appear necessary to the wet bulb thermograph do not appear to me altogether satisfactory. On almost every occasion the watering

causes a slight dislocation of the trace and implies a discontinuity in the physical condition of the instrument. When the temperature is below or in the immediate neighbourhood of 32° the behaviour of the wet bulb is decidedly not ideal. This is, of course, a comparatively rare occurrence in most years in this climate. If the Meteorological Office have no definite information as to the relative advantages and disadvantages of the hair hygrometers, which seem pretty commonly used in some foreign countries, it seems a question for examination. Another question that seems to have received much attention abroad is that of the artificial ventilation of thermometers. Assmann's arrangements seem in pretty common use.

Black Bulb Thermometers in vacuo.—We have had a good deal of trouble on this head, but I think it is not a subject that the Meteorological Office takes up. Mr. Hicks is making some black bulb thermometers of a new kind which we expect to have an opportunity of examining.

Sunshine Recorder.—The Office has been informed before that the time scale of our instrument is not absolutely correct at all seasons of the year. From our experience here we have reason to think that if the different sunshine recorders in use in this country were set up in one place there would be some startling discrepancies. There are differences in the glass and in its back focal length, as well as in the distance between the glass and the cards. Usually the surface of the card comes within the back focal distance, and in consequence, during strong sunshine, the width of the burned strip is sometimes distinctly too large. This tends, of course, to exaggerate the duration of strong sunshine, especially when there are frequent interludes of sunshine and shadow. In faint sunshine, on misty days, there are somewhat conspicuous differences between instruments; in some cases there is no visible record when in other cases it is quite distinct. Those concerned in the development of health resorts are not the most likely persons to appreciate the importance of uniformity in sunshine recorders. If the Meteorological Office saw its way to specify an exact standard there should be a distinct advantage in accuracy.

Barograph.—The Office is aware that the compensation for temperature is not absolutely correct. This introduces, of course, variation into the "residual" correction. During 1900 the working standard barometer—with which the absolute measurements are taken—has been on the whole somewhat dirty. As notified in the "tabulations," it was recently found necessary to clean the instrument, and as the first attempt was unsuccessful the operation had to be repeated. On these grounds the conditions under which barometer readings have been taken have been more variable and less satisfactory than usual. There have been, however, a good many comparisons of the working standard with the large standards, and it is hoped that no serious uncertainties have been introduced.

Anemometers.—During the past year, as repeatedly mentioned to the Office, the behaviour of the Dines' anemometer in light

winds has been unsatisfactory. The last attempts to reduce the friction of the vane have certainly improved the action, but even at its best the instrument is seemingly less satisfactory in light winds than the Robinson, which in its turn is not satisfactory when a constant factor and uniform friction correction is assumed. The more I see of the Dines the stronger is my impression that it is not a proper type of instrument for giving mean velocities or the integral of mean velocity. It seems an absolute waste of the record to regard it as intended for the drawing by hand of a continuous curve through the parts of the sheet where there is most ink. If the instrument is sufficiently dead beat, and the length, section, &c., of the connecting tubes are practically immaterial, then the proper use to make of the trace—supposing the time scale open enough—is to minutely examine the special features of the storms. Such an examination should throw light on the existence of quasi wave motion, and by inter-comparison of traces from different stations might enable the persistence of gusts, their rate of transmission, &c., to be investigated. I do not know whether any one (say Professor K. Pearson) has carefully thought what exactly it is one gets by drawing a freehand curve through a Dines' trace, whether it is a mean velocity or the square root of a mean square. In the case of the Robinson it is certainly not an arithmetic mean velocity that is got from the trace unless the wind be steady. According to the theory which I gave in the *Phil. Mag.* (Vol. 40, 1895, pp. 63-90), when there are large and frequent oscillations in the wind velocity, the Robinson, besides smoothing down the oscillations, exaggerates the mean velocity. A similar theory has since been advanced by Rateau for air meters, and his experiments seem in the case of these instruments in good accord with the theory. I am aware that comparisons made at various stations between Dines and Robinson records, the former treated in the way described above, show very fair uniformity in the ratios of the total monthly runs given by the two instruments. Monthly runs, however, or even those for much shorter periods, comprise a great variety of conditions, and a complete comparison of the two instruments would involve a separation of the records according to wind steadiness as well as velocity.

On the question of the "factor" we know, of course, *a priori* that there is no such thing as a constant factor, and before finally deciding on any change it might be well to consider whether the application of a constant factor is the best that can be done with reasonable regard to labour involved. The application of a constant friction correction at low velocities, irrespective of the peculiarities of particular instruments or the state of the lubricant, is certainly open to criticism. For various reasons, which will be sufficiently understood from remarks made above, the question of the factor should be settled by *direct* experiments with a *Robinson* apparatus of the standard size; and it is much to be desired that the effects of variation in the experimental conditions—answering as nearly as may be to the normal gusty character of wind—should be ascertained. A "factor" based on rotation experiments, in each of which uniform velocity is aimed at, may not be the

best to apply to an anemometer working under normal conditions. It is also, I think, open to doubt how far motion in a circle influences the record through centrifugal force effects. The question of anemometer exposure—as well as height above the ground—to which Mr. Curtis has frequently called attention—is also of great importance. In a much sheltered station reducing the factor from 3 to, say, 2·25 would certainly be a step in the wrong direction so far as concerns the deduction of the true wind velocity at a given height above level ground free from trees or buildings. Unless the exposure is really good, it might be best to have various factors according to the wind direction, these being determined by special experiments made with an auxiliary anemometer at the nearest available open space. In comparing small anemometers here we find it expedient to disregard records in south winds, the dome interfering slightly with anemometers placed on the existing staging (though not, we hope, with our standard Robinson itself).

Atmospheric Electricity.—In the summer some experiments were made as to the relative goodness of insulation afforded by the Mascart insulators employed here and by blocks of solid paraffin and sulphur. When quite fresh and free from dust the paraffin and sulphur—which gave almost identical results—insulated very decidedly better than the Mascart's. After, however, several weeks' use this superiority had very much diminished; but it was thought that if an arrangement were devised protecting the sulphur or paraffin from dust, one or other might probably be a distinct improvement on the Mascart's. At Lyons, Le Cadet describes the use of sulphur pillars—replaced at intervals—as a great improvement on the insulators previously tried, and the present acting Director of Batavia Observatory spoke warmly of stearine pillars replaced monthly. It is desirable that the insulation should be as nearly uniform as our variable climate permits, otherwise there are difficulties in the interpretation of the records from the water dropper. We cannot at present claim to have reached the standard of uniformity that is desirable. Partly as a check on the insulation, eye observations with a portable electrometer have been made as regularly as circumstances allowed on a pillar in the garden.

During the experiments with the paraffin and sulphur insulators some of the results suggested, if they did not absolutely prove, that when the thermometer apparatus in the same room was heated to near the boiling point the insulation fell off. Vapour—whether steam or products of combustion—is *a priori* a probable cause of defective insulation. The Director has, however, decided to put up a partition across the room, so that in the near future this probable source of disturbance will be removed or much reduced.

In some of his recent work Lord Kelvin found that a water dropper generated electricity to some extent, but expressed the opinion that with an instrument working, like ours, in the

open air this defect is wholly negligible. It may, however, be doubted whether in very calm weather such is absolutely the case.

Rain Gauge.—Besides the pen referred to by Mr. Constable, trial was made both on the rain gauge and on the Dines anemometer of a Dittmar pen obtained from the Cambridge Instrument Company, but the results were not satisfactory in either case.

When inspecting the electrograph curves casually alongside of the rain cards, at times when negative potential has existed, I have been struck by the fact that the scale of the rain gauge cards seems rather contracted for this kind of work. When a sudden change of potential arises it would be interesting to know whether there has been any corresponding irregularity in the rainfall. Again with a very light rainfall the change of ordinate in the rain curve is so microscopic, taking the thickness of the line into account, that sometimes one is in doubt whether negative potential has or has not been accompanied by rain.

Earth Thermometry.—Nothing has been done in this direction here since a report was made on the electrical resistance thermometers kept underground for a year.

CHARLES CHREE.

NOTES BY MR. CONSTABLE.

The self-recording instruments as a whole are working well, and considering the length of time they have been in use, they show but little signs of wear, the most pronounced wearing being naturally in the pallets and escape wheel of the driving clocks.

There are a few small details which could be improved upon.

1. Anemometer.—The records on the metallic sheets as at present used are very indistinct indeed in damp weather, and the substitution of silver for present brass helics would largely overcome this, or failing this change, then the metallic surface of the paper should be better than it is now.

The question of the continued employment of the factor 3 wants discussion, and it seems a pity to go on indefinitely producing curves and records which are known to be erroneous.

2. Photographic sheets.—A reduction in the annual cost of the photographic paper could be obtained by discontinuing the use of the "second" or duplicate curves on the barograph and thermograph.

Personally, I think these duplicate curves are now unnecessary, as a total failure with the present gelatino-bromide sheets

is practically unknown, and the "second" sheets have been dropped at Oxford and Valencia.

3. Rain gauge.—The Willesden sheets now used for this instrument have proved to be an improvement, where care has been taken with them, but the pens are rather too liable to sudden death if jammed or knocked, and we are trying to improve upon this by the use of a silver barrel pen which is stouter and more rigid and has very little of the ink exposed.

The Beckley rain gauge is now looked upon as the M.O. standard, but its present make, &c., can be decidedly improved upon.

In practical use it has the following faults:—

1. The scale, both as to rainfall and time, is much too contracted.

2. The rate of emptying is not fast enough.

3. Also the float-receiver should be made to hold more than at present before discharging, say 0·3 or 0·4 inch. This would reduce considerably the number of emptyings for a given fall, and in conjunction with an improvement in No. 2 would be decidedly better, as with the present arrangement there is always a doubt in *very* heavy rains—such as accompany thunderstorms, &c.—as to whether the falling rain is not escaping as the water empties out.

A rectangular lamp, say same length as inside of iron cover, with a small circular wick should be provided for use in snowstorms, &c. The evaporation, caused by warming the bottom of receiver and pipe, could be neglected, bearing in mind the ordinary conditions prevailing with snow measurements.

E. G. C.

NOTES on the WORK of the BEN NEVIS OBSERVATORIES, forwarded by Sir A. MITCHELL, Honorary Secretary of the Scottish Meteorological Society.

Scottish Meteorological Society,
122, George Street, Edinburgh,
.17th June, 1901.

With reference to the two concluding paragraphs of your letter of 7th March, I beg to say that the work done at the two Observatories has been exactly the same during all the years of their existence. A copy of all the observations made at the High Level Station up to 31st May of this year has been transmitted to your Council, and also a copy of all observations made at the Low Level Station up to 30th June, 1900. The causes of this difference are known to you. I enclose for your information the two last reports on the work of the Observatories,

which were made to the British Association for the Advancement of Science,* and also a copy of those parts of the two last reports to the Scottish Meteorological Society which bear on the subject. As you are probably aware, the whole of the observations made simultaneously at the High and Low Level Observatories over a period of 11 years—that is, a sun spot period—are now being put into type. More than half of the first volume is already printed off. The cost will be about £1,000, and the Royal Societies of London and Edinburgh have undertaken to meet this charge. The whole work of the period of 11 years, which will be completed at the end of this year, is at the same time being studied in various directions by Dr. Buchan and Mr. Omond, with the aid of skilled assistants whom the Directors have been enabled to employ. It is intended to print the results of this research with the observations, and the Directors hope that they will disclose a practical utility of the work in its influence on weather forecasting, and a scientific utility in the general study of the phenomena of weather.

It is, perhaps, desirable to say that some of the results of the study to which I have referred will be given in the first volume which, as stated, is already in an advanced state of preparation. In like manner, some of the results of this study will be given in the succeeding volumes. A final contribution, dealing with the whole period, will appear in the last volume.

I am, &c.,
ARTHUR MITCHELL.

EXTRACT FROM REPORTS TO THE GENERAL MEETING OF THE SCOTTISH METEOROLOGICAL SOCIETY.

31st July, 1899.

The health of the observers at the Ben Nevis Observatories has continued good; and the laborious work of making the hourly observations, by night as well as by day, has been carried on uninterruptedly as heretofore. The Directors again record special thanks to Mr. John S. Begg for a month's volunteer services at the High Level Observatory in June last, thus affording a month's much needed relief to one of the staff.

Arrangements are being again made for the resumption of the observations at the Intermediate Station on Ben Nevis, at a height of 2,200 feet, during the coming holiday season.

Observations have been received from Dr. Paterson, Medical Missionary, the Society's corresponding member at Hebron in Palestine. These observations are from February, 1896, to March, 1899, and a discussion of these valuable records will appear in the forthcoming *Journal*.

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* These reports are printed in the B.A. Reports, Dover, 1899, and Bradford, 1900.

Arrangements have been made for the publication, during the next three years, in the *Transactions* of the Royal Society of Edinburgh, of the observations made at the two Observatories from 1888 to 1901, the time to which it has been proposed to continue the observations. These observations will fill three large quarto volumes, the cost of publishing which will be a little over £1,000. The Royal Society of London have agreed to give £500, being half of the whole expenditure, the balance being met by the Royal Society of Edinburgh.

Meanwhile the printing is being proceeded with, and a few of the early sheets are submitted to the meeting.

No time is lost in pressing forward the preparation for publication of the next issue of the Society's *Journal*, for the two years 1897-98. It will be in the hands of Members some time before Christmas.

Much time continues to be given to the discussion of the hourly observations of the two Observatories. The work of reducing and entering the observations of the two Observatories for every day, side by side, so as to present a direct and easy comparison of the two, is far advanced, being carried down to the close of 1897. The number of daily sheets thus finished is 2,710, and as each sheet contains twenty-two columns, the laboriousness of the work will be in some degree understood.

As explained in previous Reports, the rainfall, fog, thunder, lightning, halos, aurora, and other phenomena observed at 120 places on each day are entered on a map of Scotland for that day. The whole of these maps are now completed down to December, 1898; the number of these maps amount to 2,922. A beginning has been made to enter on the 2,922 maps the gales and storms that have been noted at the lighthouses round the Scottish coast, care being taken to mark the hour of commencement of each storm, so that a comparison may be made with the outburst of the storms and the forecasts issued by the Meteorological Office in London.

Based on the observations of the two Observatories thus presented and charted, various inquiries are afoot by the Secretary and Mr. Omond, both of a scientific and practical character.

19th March, 1900.

The observations at the Intermediate Station on Ben Nevis were undertaken by Mr. D. W. Wilton. These important observations, made in the summers of 1897, 1898, and 1899, are being discussed under the superintendence of Mr. Omond.

The next number of the Society's *Journal* is nearly all in type, and will be distributed to Members early in April. Thereafter, the publication of the second half of Vol. VI. of the *Journal* will be pushed forward, and it is expected that the part will be ready for distribution in the autumn. A good deal has been done in preparing for the press No. XVII. of the *Journal*, containing, among other matters, the Meteorology of Scotland for 1899.

Part of the time of the staff is taken up in revising the proof sheets of the hourly observations of the Ben Nevis Observatories now in the press. It need scarcely be added that the revision of the work, which will fill three large quarto volumes, is peculiarly heavy. The work of reduction and entering on daily sheets the hourly observations of the two Observatories is practically brought down to date. The daily maps of rainfall, fog, storms, and other weather phenomena are completed to December, 1899; and for several months, there are already entered on the same maps the details for storms, forecasts, and storm warnings, with which are compared the hourly observations at the Ben Nevis Observatories, with the view of arriving at some definite knowledge of the relations existing among the phenomena observed and the Meteorology of Scotland, particular attention being in the first place given to the relations between the double set of observations made at Ben Nevis, and the forecasts or warnings issued of storms, rain, fog, and the other weather phenomena.

For several months Mr. Omond has had under discussion all hourly temperatures observed at Fort William and the top of the mountain, showing a difference between the two temperatures distinctly less than the usual difference, together with all cases where the temperature at the top exceeded the temperature at Fort William at the time. It will thus be recognised that this work is largely an inquiry into the anti-cyclone, and its connections with the cyclone and weather changes accompanying their changing relations. Mr. Omond gives an account of this work to the meeting of to-day.

34, Drummond Place, Edinburgh,
17th June, 1901.

DEAR MR. SHAW,

Since writing my letter to you of this date I have received a letter from Lord McLaren, the President of the Directors of the Ben Nevis Observatories, in which he states (as he had before stated to me by word of mouth) "that one of "the objects in view in continuing the double series of ob- "servations for a period of eleven years, was to test the cor- "respondence of variations of temperature with the prevalence "of sun spots, a problem of great interest to astronomers and "physicists; and that in the opinion of our Committee, as this "is the year of minimum sun spots, it is desirable to continue "the observations for another year in order to see whether there "will be a change of sign in the variations of temperature "corresponding to the change of sign in the variations of solar "activity."

I think that you will be pleased to have Lord McLaren's view on this subject, and I beg you to be good enough to communicate it to your Council.

Believe me, &c.,

ARTHUR MITCHELL.

Comparison of Instruments.

The following tables give the corrections required to be applied to the readings of the instruments at the stations visited by the Inspectors to make them agree with the Inspectors' standards :—

Barometers.

Telegraphic Reporting Stations.

Stations.	Inspector's Standard Corrected.	Reporting Barometer.	Check Barometer	Remarks.
England and Wales.	Inches.	Inches	Inches.	
Dungeness	29·740	+ ·006	+ ·020	
Holyhead	—	—	—	
Jersey	30·140	+ ·005	+ ·008	
Liverpool (Bidston) ..	—	—	—	Not visited.
London (Brixton) ..	29·526	- 003	—	
London Meteorological Office	29·790	+ ·004	—	
Loughborough	—	—	—	Not visited
Oxford	—	—	—	
Pembroke (St. Ann's Head).	30·231	+ ·013	+ ·013	
Portland Bill	30·413	+ ·001	+ ·004	
Scilly	30·377	- ·001	- ·002	
Shields	—	—	—	
Spurn Head	30·172	+ ·008	—	
Yarmouth..	—	—	—	
Scotland.				
Aberdeen	29·625	·000	+ ·003	
Leith	29·747	- ·001	+ ·002	
Nairn	30·050	·000	+ ·003	
Stornoway	30·064	+ ·002	+ ·020	Vernier of check barometer out of order.
Sumburgh Head ..	—	—	—	Not visited.
Wick	30·326	+ ·002	+ ·009	Both barometers now hang together.

BAROMETERS.

NORMAL CLIMATOLOGICAL STATIONS (Second Order Station, International Classification).

STATION.	Inspector's Standard Corrected.	Reporting Barometer.	Check Barometer.	REMARKS.
ENGLAND AND WALES.	Inches.	Inches.	Inches.	
Ampleforth	29·446	− ·004	—	
Belvoir Castle	29·852	+ ·002	—	A very good Fortin.
Bramley	29·216	+ ·004	—	
Chester	29·979	+ ·005	—	
Eastbourne	29·724	+ ·006	—	
Edgbaston	—	—	—	
Fulbeck	29·946	− ·002	—	
Morpeth	29·581	+ ·003	—	
Parkstone	30·332	− ·003	− ·002	
Plymouth	30·406	− ·001	—	
St. David's	30·189	+ ·007	—	
St. Leonards	29·696	+ ·003	—	
Seaham	29·492	− ·006	—	
Southampton	30·183	+ ·017	—	
Stokesay	29·470	+ ·002	—	
Stonyhurst	—	—	—	
Tealby	29·791	+ ·009	—	
Tenby	30·209	− ·018	—	
Wessington Court ..	29·771	− ·004	—	
SCOTLAND.				
Braemar	28·375	+ ·003	—	
Dundee	29·612	+ ·002	—	
Dunrobin	30·277	− ·001	—	
Edinburgh	29·426	− ·004	−	
Fort William .. .	30·137	− ·006	—	
Glencarron	29·666	+ ·016	—	
Gordon Castle	29·812	+ ·004	—	
Lairg	30·000	+ ·020	—	
Lednathie	29·194	+ ·002	—	
Poltalloch	29·910	+ ·028	—	
Rothesay	29·606	− ·003	—	

BAROMETERS.

OTHER CLIMATOLOGICAL STATIONS.

STATIONS.	Inspector's Standard Corrected.	Reporting Barometer.	Check Barometer.	REMARKS.
ENGLAND AND WALES.	Inches.	Inches.	Inches.	
Littlestone	29·777	− ·005	—	
Totland Bay	30·245	+ ·009	—	

THERMOMETERS.

TELEGRAPHIC REPORTING STATIONS.

STATIONS.	Inspector's Standard Corrected.	Dry Bulb.	Wet Bulb.	Maximum.	Minimum.	Grass Min.	Spare.	REMARKS.
ENGLAND AND WALES.	°	°	°	°	°	°	°	
Dungeness ..	51·1	−0·1	−0·1	0·0	0·0	—	−0·2	
Holyhead	58·7	−0·5	−0·3	+0·6	+0·1	—	−0·3	
Jersey	62·0	−0·7	+0·1	−0·7	+0·1	—	−1·0	Scale of dry bulb defective.
Liverpool (Bidston).	—	—	—	—	—	—	—	Not visited.
London (Brixton)	54·0	−0·1	+0·1	0·0	0·0	−0·1	—	
London M.O. ..	63·0	0·0	−0·1	+0·1	0·0	—	—	
Loughborough ..	—	—	—	—	—	—	—	Not visited.
Oxford	59·0	−0·3	−0·3	−0·4	+0·1	+0·4	—	
Pembroke (St. Ann's Head).	63·9	−0·1	+0·2	0·0	+0·1	—	−0·1	Scale of wet bulb almost illegible.
Portland Bill ..	61·0	0·0	+0·1	0·0	+0·9	—	0·0	The spirit column in the minimum was broken.
Scilly	63·4	−0·6	−0·4	−0·4	−0·1	—	0·0	
Shields	57·0	0·0	−0·3	−0·1	+0·7	—	—	
Spurn Head ..	58·0	−0·3	−0·2	0·0	0·0	—	0·0	
Yarmouth.. ..	61·5	−0·1	−0·2	−0·3	+0·5	—	−0·6	
SCOTLAND.								
Aberdeen	58·7	−0·1	−0·1	−0·1	−0·1	—	—	
Leith	55·9	−0·1	−0·2	−0·0	+0·4	—	−0·2	
Nairn	60·4	−0·7	−0·7	−0·0	+0·1	—	−0·1	
Stornoway ..	61·3	−0·1	−0·1	+0·2	+0·1	—	−0·1	
Sumburgh Head	—	—	—	—	—	—	—	Not visited.
Wick	59·9	−0·5	−0·5	0·0	+0·1	—	—	
IRELAND.								
Blacksod Point ..	49·9	−0·2	−0·2	+0·1	+1·0	—	−0·3	
Donaghadee ..	49·7	−0·3	−0·4	0·0	+0·5	—	0·0	
Malin Head ..	50·7	−0·3	−0·2	+0·1	−1·0	—	—	
Parsonstown ..	56·6	−0·5	−0·2	−0·4	+0·1	—	—	
Roche's Point ..	54·1	−0·7	−0·4	+0·1	+0·3	—	−0·4	
Valencia	54·3	−0·6	−0·5	−0·5	−0·1	—	+0·3	

THERMOMETERS.

NORMAL CLIMATOLOGICAL STATIONS (Second Order Station, International Classification.)

STATIONS.	Inspector's Standard Corrected.	Dry Bulb.	Wet Bulb.	Maximum.	Minimum.	Grass Min.	Spare.	REMARKS.
ENGLAND AND WALES.	°	°	°	°	°	°	°	
Ampleforth ..	54·3	0·0	+0·1	—	—	—	—	A "Six" Max. and Min.
Belvoir Castle ..	56·3	−0·6	−0·6	−0·3	−0·2	−0·7	0·0	
Bennington ..	62·0	−0·1	−0·1	−0·2	−0·2	0·0	—	
Berkhampstead..	58·4	−0·4	−0·3	+0·1	0·0	0·0	—	
Bramley	52·8	0·0	+0·1	+0·1	+1·1	—	—	
Chester	63·3	−0·1	0·0	−0·7	0·0	−0·2	—	
Darwen	49·7	−0·1	−0·1	−0·6	+0·3	—	—	
Durham	51·9	−0·1	−0·1	−0·1	+0·3	—	—	
Eastbourne ..	51·1	0·0	0·0	0·0	+1·1	—	—	
Edgbaston ..	62·0	−0·7	−0·7	0·0	−0·1	—	—	
Fulbeck	64·0	−0·1	−0·1	−0·1	0·0	0·0	—	
Lytham	57·3	−0·1	−0·1	−0·2	−0·1	—	—	
Morpeth	52·0	0·0	0·0	+0·1	+1·0	0·0	—	
Parkstone	63·0	−0·2	−0·1	−0·2	+0·3	+0·5	—	
Plymouth	61·7	0·0	−0·3	−0·4	+0·7	+0·3	—	(Plymouth).—The minimum read at first 1·5 too low. The error could not be reduced below 0·7. The grass minimum had a large error owing to the spirit column being broken.
Rousdon	60·8	−0·1	+0·3	+0·1	+0·7	+1·0	—	
St. David's .	58·2	−0·4	−0·5	−0·9	−0·2	+1·4	−0·1	
St. Leonard's ..	51·3	−0·5	−0·7	−0·2	−0·1	—	—	
Scarborough ..	54·4	0·0	0·0	+0·1	+0·5	—	—	
Seaham	60·2	−0·6	−0·8	+0·2	+0·2	—	−0·8	
Southampton ..	59·0	−0·3	−0·1	−1·0	+0·2	0·0	—	
Stokesay	61·5	−0·3	−0·5	−0·3	−0·2	+0·4	—	
Stonyhurst ..	57·0	−0·1	−0·3	−0·1	+0·4	+0·4	—	
Tealby	51·0	−0·5	−0·6	−0·9	+1·0	—	−0·2	
Tenby	62·4	−0·3	0·0	−0·2	0·0	+1·0	—	
Wessington Court	58·4	−0·4	−0·3	−0·3	+0·1	−0·1	—	
SCOTLAND.								
Braemar	54·4	−0·3	−0·4	0·0	0·0	—	—	
Dundee	52·0	+0·5	+0·5	−1·4	+0·4	—	—	
Dunrobin	62·8	0·0	0·0	−0·1	0·0	—	—	
Edinburgh ..	55·2	−0·2	−0·3	+0·4	0·0	+0·2	0·0	
Fort William ..	60·3	−0·2	−0·2	0·0	0·0	—	—	
Glencarron ..	58·0	−0·1	−0·1	+0·1	+0·2	—	—	
Gordon Castle ..	58·0	0·0	+0·1	0·0	+0·2	—	—	
Lairg	57·5	0·0	−0·2	−0·1	−0·1	—	—	

THERMOMETERS—*continued.*

NORMAL CLIMATOLOGICAL STATIONS—*continued.*

STATIONS.	Inspector's Standard Corrected.	Dry Bulb.	Wet Bulb.	Maximum.	Minimum.	Grass Min.	Spare.	REMARKS.
SCOTLAND—*cont.*	°	°	°	°	°	°	°	
Lednathie	55·0	−0·2	−0·2	−0·2	+0·3	—	—	
Poltalloch ..	59·0	0·0	0·0	0·0	+0·3	—	—	
Rothesay	56·8	0·0	0·0	+0·2	+0·3	—	—	
IRELAND.								
Armagh	63·5	−0·4	−0·4	0·0	0·0	—	—	
Belfast	50·1	0·0	0·0	+1·0	+0·2	—	—	
Markree Castle ..	53·7	−0·2	−0·3	−0·4	+0·3	+0·2	—	
Parsonstown ..	56·7	−0·5	−0·2	+0·1	−0·2	—	—	

THERMOMETERS.

OTHER CLIMATOLOGICAL STATIONS.

STATIONS.	Inspector's Standard Corrected.	Dry Bulb.	Wet Bulb.	Max.	Min.	Grass Min.	Spare.	REMARKS.
ENGLAND AND WALES.	°	°	°	°	°	°	°	
Alnwick Castle	50·0	−0·2	−0·2	−0·2	+0·4	—	—	
Cirencester ..	64·4	0·0	0·0	+0·1	0·0	+0·4	—	
Clifton	58·0	−0·6	−0·2	−0·4	0·0	—	—	
Cullompton ..	62·1	−0·1	−0·4	0·0	+0·3	+0·5	—	
Felixstowe ..	52·0	0·0	0·0	+0·3	−0·2	—	—	
Littlestone ..	47·8	+0·2	+0·1	+0·2	+0·6	+0·9	—	
Llandovery ..	63·0	—	—	−0·7	+1·2	—	—	
St. Helen's ..	50·6	−0·1	−0·1	−0·2	+0·2	+0·5	—	
St. Leonard's ..	51·3	−0·5	−0·7	−0·2	−0·1	—	—	
Shaftesbury ..	61·5	0·0	0·0	−0·2	0·0	—	—	
Swarraton ..	57·7	0·0	−0·1	−0·6	−0·2	—	—	
Totland Bay ..	62·0	−0·2	+0·3	−0·2	+1·2	—	—	Could not detect any spirit at top of tube of minimum.
SCOTLAND. None.								
IRELAND.								
Edenfel	50·7	—	—	+0·2	−0·3	—	−0·7	
Kingstown ..	—	—	—	—	—	—	—	
Newcastle ..	56·7	−0·5	−0·6	−0·1	−0·3	—	—	

THERMOMETERS.

OBSERVATORIES.

STATIONS.	Inspector's Standard Corrected.	Dry Bulb.	Wet Bulb.	Max.	Min.	Grass Min.	Spare.	REMARKS.
ENGLAND AND WALES.	°	°	°	°	°	°	°	
Falmouth ..	55·0	−0·6	−0·1	−0·5	+0·1	—	—	
Oxford	59·0	−0·3	−0·3	−0·4	+0·1	+0·4	—	
Stonyhurst ..	57·0	−0·1	−0·3	−0·1	+0·4	+0·4	—	
SCOTLAND.								
Aberdeen ..	51·0	−0·1	−0·6	0·0	+0·3	—	—	
Fort William ..	57·0	0·0	−0·2	0·0	−0·1	—	—	
Glasgow.. ..	57·0	0·0	0·0	0·0	+0·1	—	—	
IRELAND.								
Valencia	54·3	−0·6	−0·5	−0·5	−0·1	—	+0·3	

APPENDIX X.

REPORT ON INVESTIGATIONS IN ATMOSPHERIC ELECTRICITY.

The principal results of the investigations are contained in two papers, the first "On the Comparative Efficiency as con-"densation nuclei of positively and negatively charged Ions," already published (Phil. Trans. A. 193, pp. 289-308), the second "On the Ionisation of Atmospheric Air," sent with this report. A preliminary note, containing a statement of some of the results of the experiments which are described at length in the latter paper, was read before the Cambridge Philosophical Society on November 26th, 1900. (Many of the results were arrived at independently by Geitel in a paper published almost simultaneously in the Physikalische Zeitschrift.)

In these two papers experiments are described proving that water condenses much more readily on negatively than on positively charged "ions," and that such ions are continually being produced in atmospheric air even in the dark. The degree of supersaturation required to make water condense on positive and negative ions respectively was measured; and an approximate determination was made of the number of ions produced per second in each c.c. of air at atmospheric pressure. The number of ions produced per c.c. was found to be nearly proportional to the pressure.

In addition to the problems considered in the two papers named, several other questions have been investigated; the results arrived at are, however, of less importance, and I have not considered them deserving of publication.

An attempt to derive information from a comparison of the Greenwich and Kew electrograph curves was abandoned on account of the methods employed at the two observatories not being comparable, and from the want of knowledge of the scale values of the Greenwich curves.

The study of the electrograph curves showed how difficult it is to obtain really trustworthy measurements of the variations of electrical potential at a point by means of recording apparatus. This is mainly due to the difficulty of maintaining efficient insulation for long periods. My own experience has led me to conclude that sulphur is probably the most satisfactory insulating material for such work; this is in accordance with the experience of Le Cadet.

A study of the electrograph curves from Kew in connexion with the corresponding rain gauge curves and weather registers led to the following results, most of which have for long been generally accepted conclusions.

(1). The atmospheric potential is almost invariably positive except when precipitation is taking place in the neighbourhood.

Practically all cases in which even momentary periods of negative values of the potential occur, not coincident with rain, are within 36 hours of the beginning or end of the period of fine weather in which they occur.

(2). When there is precipitation, negative potentials nearly always occur. Thunderstorms, snowstorms, hail, and heavy rain are accompanied by rapid alternations of high positive and high negative values. Distant thunder is accompanied by such reversals, sheet lightning without thunder is not accompanied by any disturbance on the electrograph curve.

(3). There are cases of rain not associated with negative potentials, sometimes, in fact, accompanied by a rise in the positive potential. These seem, however, to be all cases of slight rain, generally mist or drizzle.

(4). Fogs are nearly always accompanied by abnormally high values.

(This may, perhaps, be explained if we take into account the ionisation of the air, for under the influence of the earth's potential gradient there will be a continuous streaming of positive ions down to the negatively charged surface of the earth. These will become entangled in the fog, and a positive charge will go on accumulating in the fog so long as the supply of positive ions is maintained. This action of clouds or fogs in destroying the mobility of the ions has been pointed out by Elster and Geitel in the Ann. der Physik., vol. 2, 1900, p. 425.)

(5). Clouds not associated with rain do not cause negative potentials.

(6). The usually accepted diurnal and annual variations of potential appear to be indicated by the curves.

Experiments were made on the efficiency as "collectors" of atmospheric electricity of electrometer matches and of platinum wires maintained at a bright red heat by means of a current from a secondary cell.

It was found that collectors of the latter form worked very well if not exposed to air currents strong enough to reduce their temperature below bright redness. It is probable that they would be suitable for use in balloon ascents, in which the measurements would be made with only a slight relative motion of the wire and air.

With hot wire collectors, so long as the wire is glowing brightly, the rate at which the potential of the air at the point under investigation is acquired by the electrometer is the same whether the potential of the electrometer is initially above or below that of the air; *i.e.*, whether positive or negative electricity is escaping from the collector. This is not the case, as is well known, if the wire be only dull red; positive electricity escapes from such a wire much more readily than negative. I have found the behaviour of the ordinary electrometer match to be similar to that of the dull-red wire; in this case, however,

negative electricity escapes much more readily than positive; the time required for the difference between the initial and final potential to be reduced by one-half being frequently five or six times as great when the initial potential is above the final than when it is below it. It is evident that in the case of rapidly changing potentials, whether actual reversals occur or not, this may lead to serious error; positive values of potential tending to be over-estimated and negative values under-estimated.

C. T. R. Wilson.

Sidney Sussex College,
January 30, 1901.

APPENDIX XI.

ADDITIONS TO THE LIBRARY DURING THE YEAR ENDING 31ST MARCH, 1901.

Aachen, Meteorologische Station.—Deutsches meteorologisches Jahrbuch für 1899. Meteorologische Station I. Ordnung in Aachen. Ergebnisse der meteorologischen Beobachtungen. . . . Herausgegeben . . . von P. Polis. Jahrg. 5. la. 4°. Karlsruhe, 1900.

——— ——— Ergebnisse der 1900 in Aachen von der meteorologischen Station Aachen des Königl. Preuss. Meteorologischen Instituts angestellten Beobachtungen. sm. f°. Sheet.

——— ——— **Centralstation.**—Uebersicht der Witterung. 1900, Jan.–Dec. Slips.

Adelaide Observatory.—Meteorological observations made at the Adelaide Observatory, and other places in South Australia and the northern territory, during the year 1897, under the direction of C. Todd. sm. f°. Adelaide, 1900.

[——— ———] Rainfall in South Australia and the northern territory, during 1897, with weather characteristics of each month. By Sir C. Todd. f°. Adelaide, 1900.

‖ **Africa (South-West).**—Regenmessungen in Deutsch-Südwestafrika. 1898–99. la 8°. (*Mittheil. deutsch. Schutzgeb.*, 12, 1899, *Heft* 4.)

[**Algiers, Service Météorologique du Gouvernement Général de l'Algérie.**]—Bulletin météorologique de l'Algérie. 1900, Jan. 1–Dec. 31 sm. f°. Sheets.

[**Allahabad, Meteorological Office.**]—Administration report of the Meteorological Reporter to Government, North-Western Provinces and Oudh, for the year 1899–1900. sm. f°. Allahabad, 1900.

——— ——— Annual statement of rainfall in the North-western Provinces and Oudh, for the year 1899. sm. f°. s.l.e.a.

——— ——— Brief sketch of the meteorology of the North-western Provinces and Oudh, and adjacent parts of Rajputana and the Panjab, for the year 1899. sm. f°. Allahabad, 1900.

Allingham, W.—A manual of marine meteorology for apprentices and officers of the world's merchant navies. sm. 8°. London, 1900.

——— Weather "causerie." 8°. (*Gentleman's Mag.*, 1900, *Dec.*, *p.* 606.)

‖ **Amedjowe, Togo-land.**—Resultate der meteorologischen Beobachtungen in Amedjowe in den Jahren, 1897–99. la 8°. (*Mittheil. deutsch. Schutzgeb.*, 12 1899, *Heft* 4.)

Amsterdam, Kon. Nederlandsch Aardrijkskundig Genootschap.—Tijdschrift. Tweede serie. Deel 17. 8°. Leiden, 1900.

Antigua, Government Laboratory.—Meteorological register kept at the Government Laboratory, St. John's, Antigua. 1900, June 26–Dec. 31. sm. f°. Sheets.

NOTE.—Books marked * have been acquired by purchase; the others are donations from institutions, societies, or authors. Those marked ‖ are excerpt papers, extra copies of which have been separately printed.

In some cases additional publications have been received besides those specified, but only completed volumes or years are given here.

* **Antoniadi, E.**—The photography of clouds. 2 papers. la 4°. (*Knowledge*, 23, 1900, *pp.* 79 *and* 107.)

* **Assmann, R.**—Beiträge zur Erforschung der Atmosphäre mittels des Luftballons. Unter Mitwirkung von A. Berson, H. Gross, V. Kremser und R. Süring, herausgegeben von R. Assmann. la 8°. Berlin, 1900.

* **Assmann, R. und Berson, A.**—Wissenschaftliche Luftfahrten. Ausgeführt vom Deutschen Verein zur Forderung der Luftschiffahrt in Berlin. Unter Mitwirkung von O. Baschin, W. von Bezold, R. Börnstein, H. Gross, V. Kremser, H. Stade und R. Süring. Herausgegeben von R. Assmann und A. Berson. Bd. 1–3. 3 vols., la 4°. Braunschweig, 1899–1900.

Athens, Observatoire National.—Annales . . . publiées par D. Eginitis. Tome 2. la. 4°. Athènes, 1899.

Augustin, F.—Die Temperaturverhältnisse der Sudetenländer. 1. u. 2. Theil. 2 parts, la. 8°. (*Sitzungsb. k. böhm. Gesellsch. Wissensch., math.-naturw. Cl.*, 1899, 1900.)

Azambuja, G. A. de.—Annuario do Estado do Rio Grande do Sul. 1901. Anno 17. sm. 8°. Porto Alegre, 1900.

[Bangalore, Mysore Government Meteorological Department.]—Meteorology in Mysore, for 1899, being the results of observations at Bangalore, Mysore, Hassan and Chitaldrug. 7th Annual Report by John Cook. la. 4°. Bangalore, 1900.

——— ——— Report on rainfall registration in Mysore for 1899. By J. Cook. la 4°. Bangalore, 1900.

[Batavia, Observatorium.]—Regenwaarnemingen in Nederlandsch-Indië. 20. Jahrg, 1898. la 8° Batavia, 1899.

Batavia, Royal Magnetical and Meteorological Observatory.—Die Abweichung der Magnetnadel; Beobachtungen, Säcular-Variation, Wert-und Isogonensysteme bis zur Mitte des xviii ten Jahrhunderts von W. van Bemmelen. Suppl. to vol. 21 of the Observations. f°. Batavia, 1899.

——— ——— Observations. Vol. 21, 1898. f°. Batavia, 1899.

Bath, Medical Officer of Health.—Annual report to the Bath Urban Sanitary Authority, by the Medical Officer of Health. 31st and 34th, 1896 and 1899. 2 vols., f° and 8°. Bath, 1897 and 1900.

Bathurst, Gambia.—Comparative rainfall, colony of the Gambia, 1895–1899, and meteorological observations, 1899. sm. f°. Sheet.

‖ **Bayard, F. C.**—A new reduction of the meteorological observations at Greenwich. la. 8°. (*Quart. Journ. R. Meteor. Soc.*, 26, 1900, *p.* 101.)

Belize, Public Hospital.—Meteorological observations, 1899, Jan.–Dec. sm. f°. Sheets.

‖ **Bergholz, P.**—Ueber Bildungsstätten, Bahnen und Zonen der Orkane des "Fernen Ostens." sm. f°. (*Meteor, Zeitschr.*, 1900, *Feb.*, *p.* 7..)

‖ ——— Die Ergebnisse der Beobachtungen der Wolken in Manila in dem internationalen Wolkenjahre. sm. f°. (*Meteor, Zeitschr.*, 1900, *März.*, p. 106.)

Berlin, Königlich Preussisches Meteorologisches Institut.—Bericht über die Thätigkeit . . . im Jahre 1899, von W. von Bezold. la. 8°. Berlin, 1900.

——— ——— Ergebnisse der Gewitter-Beobachtungen im Jahre 1897. la. 4°. Berlin, 1899.

——— ——— Ergebnisse der meteorologischen Beobachtungen in Potsdam, 1898. la. 4°. Berlin, 1900.

‖ ——— ——— Witterung nach den Beobachtungen des königlichen meteorologischen Instituts. 1900, Jan.–Dec. la. 4°. (*Statist. Korresp.*)

Berne, Eidgenössisches Oberbauinspectorat, Hydrometrisches Bureau.—Graphische Darstellung der schweizerischen hydrometrischen Beobachtungen sowie der Lufttemperaturen und Niederschlagshöhen für das Jahr 1899. la. f°. Sheets.

In the French language also.

Bolton.—Annual report of the Museums and Meteorological Observatory for 1900. 8°. Bolton, 1901.

Bolton, C. P. Waterford weather report, 1899, 1900. slips.

Bombay, Government Observatory.—Report on the condition and proceedings of the Government Observatory, Colaba, for the year 1899–1900. f°. (Bombay), s.a.

[Bombay Meteorological Office.]—Brief sketch of the meteorology of the Bombay Presidency for 1899–1900. f°. s.l.e.a.

* **Borchgrevink, C. E.**—First on the Antarctic Continent, being an account of the British Antarctic Expedition, 1898–1900. 8°. London, 1901.

‖ **Börnstein, R.**—Luftdruckverteilung und Monddeklination. 2°. Mitteil. la. 8°. (*Phys. Zeitschr.*, 1. *Jahrg.*, *No.* 41 *p.* 446).

——— Wetterkunde und Landwirtschaft. Festrede zur Feier des zweihundertjährigen Jubiläums des Königr. Preussen und des Geburtstags Sr. Majestät des Kaisers und Königs, gehalten in der Königl. Landwirtschaftlichen Hochshule zu Berlin am 17. Januar 1901. la. 8°. Berlin, 1901.

Bremen, Meteorologische Station I. Ordnung.—Deutsches meteorologisches Jahrbuch. Ergebnisse der meteorologische Beobachtungen. Herausgegeben von P. Bergholz. Jahrg. 10, 1899. la. 4°. Bremen, 1900.

British New Guinea.—Annual report on British New Guinea, 1897–98. 1898–99. 2 vols., small f°. Brisbane, 1898, 1900.

‖ **Bruce, W. S.**—The proposed Scottish National Antarctic Expedition. la. 8°. (*Scott. Geogr. Mag.*, 1900, *June.*)

* **Brunck, Otto.**—Die chemische Untersuchung der Grubenwetter. 8°. Freiberg, 1900.

Brussels, Observatoire Royal.—Annuaire. 1898 and supplement; 1899 and supplement; 1900. 5 vols. 18°. Bruxelles, 1898–1900.

——— ——— Annuaire astronomique. 1901. 18°. Bruxelles, 1901.

——— ——— Annuaire météorologique. 1901. 18°. Bruxelles, 1901.

——— ——— Bulletin quotidien. 1900, Jan. 1–Dec. 31. f°. Sheets.

Bucharest, Institut Météorologique.—Album climatologique de Roumanie par S. C. Hepites. oblong sm. f°. Bucuresci, 1900.

——— **Institutul Meteorologic al Romaniei.**—Analele . . . publicate de S. C. Hepites. Tom. 14, 1898. la. 4°. Bucuresci, 1900.

In the French language also.

——— ——— Buletinul lunar al observatiunilor meteorologice din Romania publicat de S. C. Hepites. Anii 8–9, 1899–1900. 2 vols., sm. f°. Bucuresci, 1900–1901.

——— ——— Buletin meteorologic. Anul 6, 1900. Jan 1–Dec. 31, la. 4°. Sheets.

Budapest, Köng. Ung. Reichsanstalt für Meteorologie und Erdmagnetismus.—Publicationen. 1900, Bd. 2. Wolkenbeobachtungen in Ó-Gyalla im Jahre 1898, bearbeitet von Sigmund von Karvásy. la. 4°. Budapest, 1900.

In the Hungarian language also.

——— ——— Publicationen. 1900, Bd. 3. Die jährliche Gang der Temperatur in Ungarn. Von Sigmund Bóna. la. 4°. Budapest, 1900.

In the Hungarian language also.

Bund, J. W. Willis.—The influence of weather on the migration of fish. 8° (*Journ. National Fish Culture Assoc., i.*, 1887. *p.* 26.)

Cairo, Ministère de l'Intérieur. Administration des Services Sanitaires et d'Hygiène Publique.—Bulletin hebdomadaire. 15me année, 1900 Nos. 1–52. Suppl. au Journ. Officiel, 1900–1901. la. 4°.

—— **Observatoire Khédivial.**—Résumé mensuel des observations météorologiques. 1895–1898, Jan.–Dec. la. 4° Le Caire, 1895–1898.

Calcutta, Meteorological Office, Bengal.—Administration report of the Meteorological Reporter to the Government of Bengal for the year 1899–1900. f°. s.l.e.a.

——— ——— ——— Bay of Bengal and Bengal daily weather report. 1900. sm. f°. Sheets.

These reports are only published during the rainy season.

[——— ——— ———] Bay of Bengal weather chart. 1900. sm f°. Sheets.

From May to October this is combined with the "Bay of Bengal and Bengal daily weather report."

(——— ——— ———) Meteorological and rainfall table of the Province of Bengal for the months of January to December, 1900, with annual tables. sm. f°. Sheets.

——— ——— ——— Meteorological summary for the monsoon period of 1900. sm. f°. s.l.e.a.

[——— ——— ———] Summary of the meteorology of Bengal for the year 1899. f°. s.l.e.a.

——— ——— **India.** Abstract of the results of meteorological observations taken at the Alipore Observatory in the months of Jan.–Dec., 1900. sm. f°. Sheets.

[——— ——— ———] Brief memorandum on the weather in India during the months of June and July, and forecast of the general distribution of the rainfall in India during the months of August and September, 1900. sm. f°. (Simla, 1900.)

——— ——— ——— India daily weather report. 1900. Jan. 1–Dec. 31. 2 vols., f°. Simla, 1900–1901.

——— ——— ——— Indian meteorological memoirs. Vol. 6. sm. f°. Calcutta, 1894–1900

[——— ——— ———] The India weather review for the year 1899. f°. Calcutta, 1900.

[——— ——— ———] Memorandum on the snowfall in the mountain districts bordering Northern India and the abnormal features of the weather in India during the past year, with a forecast of the probable character of the south-west monsoon rains of 1900. f°. (Simla, 1900.)

(Calcutta, Meteorological Office, India.) Rainfall of India. 8th year, 1898. sm. f°. Calcutta, 1899.

(—— —— ——) Report on the administration of the Meteorological Department of the Government of India in 1899–1900. f°. s.l.e.a.

—— —— —— Results of the meteorological observations taken at the Alipore Observatory, from 31st December, 1899, to 29th December, 1900.

[—— —— ——] Weather chart of the Indian monsoon area. 1899. Jan. 1–Dec. 31. f°. Sheets.

[—— **Surveyor General of India.**]—General report on the operations of the Survey of India Department . . . during 1898–99. sm. f°. Calcutta, 1900.

Cambridge (Mass.), Astronomical Observatory of Harvard College.—Annals. Vol. 42. Part 2. Observations made at the Blue Hill Meteorological Observatory, Mass., U.S.A., in the years 1897 and 1898. Under the direction of A. L. Rotch. With an appendix containing the international cloud measurements during 1896–97. la. 4°. Cambridge, 1900.

—— —— Annals. Vol. 43. Part 1. Observations and investigations made at the Blue Hill Meteorological Observatory, Mass., U.S.A., under the direction of A. L. Rotch. The eclipse cyclone and the diurnal cyclones, by H. H. Clayton. la. 4°. Cambridge, 1901.

—— **Philosophical Society.**—Proceedings. Vol. 10, 1898–1900. 8°. Cambridge, 1900.

—— —— Transactions. Vol. 18. la. 4°. Cambridge, 1900.

—— **Scientific Instrument Co.**—Callendar electric recorders, platinum thermometers, and apparatus for the measurement of small resistances. la. 8°. Cambridge, 1901.

Cape Town, Meteorological Commission, Cape of Good Hope.—Report of the Meteorological Commission for the year 1899. sm. f°. Cape Town, 1900.

Carlsruhe, Centralbureau für Meteorologie und Hydrographie.—Beiträge zur Hydrographie des Grossherzogthums Baden. X. Heft. Die Niederschlagsverhältnisse des Grossherzogthums Baden. Zweite Bearbeitung, 4° Karlsruhe, 1900.

—— —— Deutsches meteorologisches Jahrbuch. Grossherzogthum Baden. Die Ergebnisse der meteorologischen Beobachtungen im Jahre 1899. Zugleich ii. Theil des Jahresb. . . . . la. 4°. Karlsruhe, 1900.

—— —— Jahresbericht . . . mit den Ergebnissen der meteorologischen Beobachtungen und der Wasserstandsaufzeichnungen am Rhein und an seinen grössern Nebenflüssen für das Jahr 1899. la. 4°. Karlsruhe, 1900.

—— —— Niederschlagsbeobachtungen der meteorologischen Stationen im Grossherzogthum Baden. 1900, 1–2 Halb. 2 vols., la. 4°. Karlsruhe, 1900–1901.

—— —— Uebersicht der Ergebnisse der an den badischen meteorologischen Stationen angestellten Beobachtungen, nebst Wasserstandsaufzeichnungen an den wichtigsten Hauptpegeln des Rheins. 1900, Jan.-Dez. f°. Sheets.

‖ **Catania ed Etna.**—Notizie storiche e descrittive dei R. R. Osservatorii di Catania e dell' Etna fino a tutto il 1899. la. 8°. Catania, 1900. (*Ann. R. Univ. Catania, 1899–1900.*)

* **Chambers's Encyclopædia: A dictionary of universal knowledge.** New edition. Vols. 1–10. 10 vols., la. 8°. London and Edinburgh, 1895.

‖ **Chauveau, A.-B.**—Sur la variation diurne de l'électricité atmosphérique. 2 papers. 4°. (*Comptes Rendus, Paris*, 129, 1899, *p.* 500; 131, 1900, *p*, 1298.)

‖ ——— Sur l'électricité atmosphérique d'après les observations à la Tour Eiffel et au Bureau Central Météorologique, 4°. (*Comptes Rendus, Paris*, 131, 1900, *p.* 1264.)

Chaves, F. A.—Rapport sur l'établissement projeté du service météorologique international des Açores. 4°. Monaco, 1900.

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——— ——— Wochenberichte über die Schneebeobachtungen im oesterreichischen Weichsel-, Dniestr-, Styr-, Pruth- und Serethgebiete für die Zeit vom 3. Dezember 1899 bis 31. März 1900. Herausgegeben von der k. k. hydrographischen Landesabtheilung in Lemberg. f°. s.l.e.a.

In the Polish language also.

Villa Colón, Observatorio Meteorológico del Colegio Pío de Villa Colón, Monte Video.—Boletin mensual. Año xi., 1898–99. la. 8°. Monte Video, 1899–1900.

Wallis, H. S.—British rainfall, 1899. On the distribution of rain over the British Isles during the year 1899. 8°. London, 1900.

* **Ward, R. de C.**—Practical exercises in elementary meteorology. la. 8°. Boston, U.S.A., 1899.

Washington, Department of Agriculture, Weather Bureau.—Bulletin No. 28. W.B. No. 211. The climate of San Francisco, California. Prepared . . . by A. G. McAdie and G. H. Willson. la. 8°. Washington, 1899.

——— ——— ——— Bulletin No. 29. W.B. No. 219. Frost fighting. By A. G. McAdie. la. 8°. Washington, 1900.

——— ——— ——— Bulletin G. W.B. No. 221. Atmospheric radiation : a research conducted at the Allegheny Observatory and at Providence, R.I. By F. W. Very. la. 4°. Washington, 1900.

——— ——— ——— W.B. No. 232. Bulletin H. West Indian hurricanes. By E. B. Garriott. la. 4°. Washington, 1900.

——— ——— ——— Meteorological chart of the Great Lakes. 1900. May to Dec., Nos. 1 to 8. la. f°. Charts.

——— ——— ——— Monthly weather review and annual summary. Vol. 28, 1900. 4°. Washington, 1901.

——— ——— ——— Report of the Chief of the Weather Bureau. 1898–1899. 2 vols., la. 4°. Washington, 1900.

Vol. 2 comprises "Report on the International cloud observations, May 1, 1896, to July 1, 1897. Prepared . . . . by F. H. Bigelow."

——— ——— ——— Tables of daily precipitation at special river and rainfall stations of the United States Weather Bureau for the years 1893, 1894, 1895. la. 8°. Washington, 1900.

——— ——— ——— Weather map. 1900. Jan. 1–Dec. 31. la. f°. Sheets.

——— **Hydrographic Office.**—Pilot chart of the North Atlantic Ocean. 1900. Jan.–Dec. Charts. la. f°.

——— ——— Pilot chart of the North Pacific. 1900. Jan.–Dec. Charts. la. f°.

——— **Smithsonian Institution.**—Annual report of the Board of Regents . . . for the year ending June 30, 1898. 8°. Washington, 1899.

——— **United States Naval Observatory.**—Report of the Superintendent . . . for the fiscal year ending June 30, 1900. la. 8°. Washington, 1900.

‖ **Wellington, Meteorological Office.**—Rainfall. 1900. Jan.–Dec. sm. f°. Sheets. (*New Zealand Gazette.*)

* **Wetter, Das.**—Meteorologische Monatsschrift für Gebildete aller Stände. Herausgegeben von R. Assmann. 17. Jahrg., 1900. la. 8°. Berlin, 1900.

Wild, H.—Über den säcularen Gang der Inclination und Intensität des Erdmagnetismus in St. Petersburg-Pawlowsk. la. 4°. St. Pétersbourg, 1900. (*Mém. Acad. Imp. Sc. St. Pétersb.*, 8° *sér.*, *Cl. phys.-math.*, ix., *No.* 7.)

Woeikof, A.—Climat des hauteurs de l'Europe occidentale. la. 8°. [St. Petersburg], 1900. In the Russian language, with résumé in French.

‖ ——— Mitteltemperaturen von Ostsibirien. sm. f°. (*Meteor, Zeitschr.*, 1900, *März. p.* 116.)

‖ **Wollny, G.**—Ueber den Einfluss der Pflanzendecken auf die Wasserführung der Flüsse. 8°. (*Vierteljahreschr. Bayer. Landwirthschafterathes*, 1900, *Heft* 3.)

Worthing Observatory.—Meteorology, 1899. la. 8°. Worthing, [1900].

——— ——— Weather report. 1900, Jan.–Dec. 4°.

Wragge, C. L.—Meteorological work in Australia. Interview with Mr. Clement L. Wragge, Government Meteorologist of Queensland. f°. (*British Australasian*, 1900, *Oct.* 25, *p.* 1506.)

‖ **Zanotti—Bianco, O.**—Intorno ad alcuni recenti lavori Italiani sulla costituzione fisica dell'atmosfera fondati sulle osservazioni di James Glaisher. la. 8° Torino, 1900. (*Atti R. Accad. Sc. Torino*, 35, 1900.)

‖ ——— Sulla costituzione atmosferica quale risulta dalle osservazioni aereostatiche di James Glaisher e sopra una nuova formola barometrica. Mem. di F. Siacci. Atti R. Accad. Sc. fis. e mat. Napoli, 8, serie 2ª., 1897. la. 8°. (*Riv. Topogr. e Catasto*, 10.)

Zi-ka-wei, Observatoire Magnétique et Météorologique.—Bulletin mensuel. Tomes 23–24, années 1897–1898. 2 vols. sm. f°. Chang-hai, 1900.

Zomba, Scientific Department.—Means of observations at Zomba. 1899, Jan.–Mch. f°. (*British Central Africa Gazette*, 1899.)

Zürich, Schweizerische Meteorologische Central-Anstalt.—Annalen, 1898. "Der Schweiz. meteor. Beob." 35. Jahrg. 4°. Zürich, s.a.

- - - - ——— Wetterbericht. 1900, Jan. 1–Dec. 31. sm. f°. Sheets.

APPENDIX XII.

ACCOUNT of RECEIPTS and PAYMENTS for the year ending 31st March, 1901:—

RECEIPTS.	£ s. d.	£ s. d.	PAYMENTS.	£ s. d.	£ s. d.
Balance from year 1899-1900	—	3,702 11 11	ADMINISTRATION:		
Parliamentary vote ..	—	15,300 0 0	Council	917 19 10	
Repayment of expenses charged under—			Secretary	627 11 2	
			Salaries and wages ..	912 9 0	
			Rent, fuel, and lighting	733 16 0	
			Incidental and contingent expenses	245 10 7	
			Furniture and fittings ..	124 15 6	
(1.) Incidental expenses	23 11 1		Expenses incidental to International Meteorological Congress ..	26 5 11	
(2.) Observatories ..	25 11 6				
		49 2 7			3,588 8 0
SPECIAL RESEARCHES:			SPECIAL RESEARCHES:		
			Salaries and other charges	703 14 3	
Grant for investigation on atmospheric electricity	—	80 0 0	Investigation on Atmospheric Electricity ..	100 0 0	
					803 14 3
SUPPLY OF INFORMATION:			LAND METEOROLOGY:		
			Observatories and stations, including remuneration of observers..	2,254 8 6	
Daily Weather Charts and Forecasts	324 3 1		Salaries:—Discussion and reduction of observations, &c.	1,170 19 6	
6 p.m. Charts	25 0 0				
Reports for Press Agencies, &c.	117 6 6				3,425 8 0
Telegrams sent abroad	376 5 0				
		842 14 7	WEATHER INFORMATION AND FORECASTS:		
SALE OF INSTRUMENTS, &c.:					
			Telegraphic reports and storm warnings, remuneration of observers, &c.	2,627 14 11	
Royal Navy account ..	6 13 6		Salaries: — Preparation and issue of reports and forecasts	1,892 3 8	
Mercantile Marine account	23 8 0				
"M.O." (Stations) account	87 5 2				4,519 18 7
		117 6 8	INSPECTIONS:		
			Salaries and travelling expenses	—	401 10 2
Repayment of Miscellaneous commissions executed for Colonial and Foreign Institutions, &c...	—	215 17 1	OCEAN METEOROLOGY:		
			Salaries:—Discussion and reduction of observations	1,320 18 6	
Commission charged on work done for Colonies, &c.	—	16 11 9	Expenses incidental to the supply of instruments:—		
			Proportion for care and issue of instruments	125 0 0	
			Royal Navy	443 10 4	
			Mercantile Marine..	168 14 7	
					2,058 3 5
SUPERANNUATION ACCOUNT	—	35 12 6	Miscellaneous commissions executed for Colonial and Foreign Institutions, &c. ..	--	322 13 1
			SUPERANNUATION:		
			Pensions and Allowances	654 12 6	
			Provision for Annuities	1,463 0 0	
					2,117 12 6
			BALANCE:		
			Cash at Bank	3,071 4 9	
			„ at Office	51 4 4	
					3,122 9
		£20,359 17 1			£20,359 17 1

In the year 1900–1 the sum of £1,599 17*s.* 11*d.* was paid to the Post Office on account of inland and foreign telegrams, allowances to telegraph clerks, rental of private wires, &c.

APPENDIX XIII.

List of the Principal Papers printed in various Reports Issued by the Office from the Year 1866.

I.—Daily Weather Report.

Year.	Page.	——
1896 (July to Dec.).	1	Mean Values of Barometric Pressure for each Month and for the Whole Year, derived from Observations made at 8 a.m. daily during the 25 Years 1871–95.
1896	2 and 3	Mean Values of the Dry Bulb and Wet Bulb Temperatures for ditto, ditto.
"	4 and 5	Mean Values of the Daily Maximum and Minimum Temperatures, and of the Maximum and Minimum combined, for the 25 Years 1871–95.
"	6 and 7	Extremes of the Daily Maximum and Minimum Temperatures for ditto, ditto.
"	8	Mean Rainfall for each Month and for the Whole Year—derived from Observations extending over the 30 Years 1866–95.
"	9	Mean Numbers of Hours of Bright Sunshine, with the Percentages of Possible Duration, derived from Observations extending over the 15 Years 1881–95.

II.—Weekly Weather Report.

Year.	Page.	——
1884	V.	Table A.—Showing for each Degree of Latitude, from 49° N. to 58° N. the Total Number of Hours during which the Sun is above the Horizon, in each Month of the Four Quarters of the Year.
"	VI.	Table B.—Showing similar information for each Week of the Year.
1895	VI.–VII.	Mean Values of the Daily Maximum and Minimum Temperatures, and of the Maximum and Minimum combined, for each Month and for the Whole Year, derived from Observations extending over the 25 Years 1871–95.
"	VIII.	Mean Rainfall for each Month and for the Whole Year, derived from Observations extending over the 30 Years 1866–95.

Year.	Page.	——
1895	IX.	Mean Numbers of Hours of Bright Sunshine, together with the Per-centages of the Possible Duration, for each Month and the Whole Year, derived from Records extending over the 15 Years 1881–95.
1900	[1-9]	Summaries of Rainfall and Mean Temperature for the First, Second, Third, and Fourth Quarters, and for the Whole Year, during the 35 Years 1866–1900. [The separate Yearly Values for 1866-85 are contained in the Reports for 1890, and previous Years.]
1895	[17]	Table I.—Showing for each District, during the Lustrum 1896–1900, and the whole Period comprehended in the 20 Years 1881–1900, the Mean Aggregate numbers of rainy days from the beginning of the Year to the end of each week in the Year.
,,	[21]	Table II.—Showing in the same detail the Mean Aggregate Amounts of Rainfall.
,,	[25]	Table III.—Showing in the same detail the Mean Aggregate Values for Accumulated Heat above 42° F.
,,	[29]	Table IV.—Showing in the same detail the Mean Aggregate Values for Accumulated Heat below 42° F.
,,	[33]	Table V.—Showing in the same detail the Mean Aggregate Numbers of Hours of Bright Sunshine.
,,	[37]	Table VI.—Showing in the same detail the Mean Per-centages of the possible amount of Bright Sunshine.
,,	[41]	Table showing in the same detail the Mean Temperature of the Air.

III.—Monthly Weather Report.

Year.	Page.	——
1884	[i.]	On London Rain. By W. J. Russell, Ph.D., F.R.S.
	[ii.]	On the Amount of Carbonic Acid in London Air. By W. J. Russell, Ph.D., F.R.S.
,,	[iii.]	Table showing for each Month and for each Degree of Latitude from 18° N. to 49° N. the Total Number of Hours during which the Sun is above the Horizon.
,,		
1885	[i.]	On the Impurities in London Air. By W. J. Russell, Ph.D., F.R.S.
,,	[ii.]	Table showing the Mean Monthly and Annual Rainfall at the Weekly and Monthly Weather Report Stations for the 20 Years 1866 to 1885.

IV.—Quarterly Weather Report.

Year.	Page.	——
1869	43	Factors for Calculation of Gradients.
„	[1]	Notes on Easterly Gales, by R. H. Scott.
1870	iii.	Description of Observatories, with illustrations of thermometer screens
„	[23]	Bessel's Paper on the Determination of the Law of a Periodical Phenomenon. Translated from the Astronomische Nachrichten, 136, for May, 1828.
1871	[7]	Discussion of Anemometrical Results for Orkney, 1863–68.
„	[59]	Constants for the Determination of the Monthly March of Atmospherical Pressure, &c. at the Seven Observatories for 1869–70.
1872	[13]	Discussion of the Anemometrical Results at Bermuda from 1st April 1859 to 31st March 1863.
1873	[13]	Rainfall of the London District for Sixty Years, 1813–72. By G. Dines, F.M.S. [with diagram].
1874	[26]	On the Winds at Liverpool. By W. W. Rundell.
1875	[1]	Observations taken at Nine Stations of the Second Order [1875].
„	[89]	Mean Monthly Results for the Seven Observatories for the Lustrum, 1871–75.
1876	[13]	Report on the Reduction of Greenwich Curves for 1875 to a Common Standard with those of Kew [with 25 plates].
„	[20]	Results of Observations made at the Pagoda, Kew Gardens, to Determine the Influence of Height on Temperature, &c. By R. H. Scott, F.R.S. [4 plates.]
„	[39]	Comparison of Results obtained by means of the Harmonic Analyser, with similar Results got from Measurement and Numerical Calculation for the Seven Observatories.
1877	[13]	On the Diurnal Range of Rainfall at the Seven Observatories in connexion with the Meteorological Office, 1871–80. By R. H. Scott, F.R.S. [5 plates.]
„	[35]	Report on Evaporimeters. By W. N. Shaw, M.A. [2 plates.]
1878	[13]	On the Computation of the Quantity of Heat in excess of any Fixed Base Temperature, received at any place during the course of the Year, &c. By Lieut.-Gen. Strachey, R.E., F.R.S.
1879	[13]	Report on Experiments made at Strathfield Turgiss in 1869 with Thermometer Stands or Screens of various patterns, &c. By F. Gaster.
,	[41]	Report on Hygrometric Methods, &c. Part I. By W. N. Shaw, M.A.
1880	[13]	Report on Experiments made at the Kew Observatory with Thermometer Screens of different patterns during 1879, 1880 and 1881. By G. M. Whipple, Superintendent.
,.	[19]	Tables and Diagrams illustrating the Diurnal Range of Barometric Pressure in the British Isles during the Years 1876-80. By F. C. Bayard, LL.M., F.R. Met. Soc. [5 plates.]

V.—Report of the Meteorological Committee of the Royal Society.

Year.	Page.	——
1867	27	A Description of the Self-recording Instruments recently erected by the Meteorological Committee of the Royal Society in various parts of the United Kingdom. [With plates.]
1869	25	Note upon a Self-registering Thermometer adapted to Deep-Sea Soundings, by W. A. Miller, M.D., Treasurer and V.P.R.S., extracted from Proceedings of Royal Society, vol. XVII., p. 482.
1869	36	Description of a Self-recording Rain-gauge, invented by Robert Beckley, of the Kew Observatory; made by James Hicks, London.
1870	25	Description of the Process by which the Traces of the Self-registering Instruments are reduced suitably for publication.
1872	27	A Summary of the Results obtained from the Discussion of the Information for Square 3, being the Region of the Doldrums in the Atlantic. By Capt. H. Toynbee, Marine Superintendent.
1874	33	The International Maritime Conference.

Va.—Report of the Meteorological Council.

Year.	Page.	——
1877–78	21	Account of the Experiments on Atmospheric Electricity conducted at Kew Observatory. By Prof. J. D. Everett.
1879–80	28	On the Effect of Sluggishness on the Readings of Marine Barometers on Shore, by Prof. Stokes.
„	43	On the Methods available for the Determination of the Humidity of the Atmosphere, by W. N. Shaw.
„	46	Memorandum as to the Employment of the Harmonic Analyser in the Meteorological Office, by Prof. Stokes.
1880–81	25	On the Working of the Harmonic Analyser. [Prof. Stokes.]
„	27	Report on Fogs. [W. J. Russell.]
„	28	„ „ Hygrometers and Evaporimeters, presented to the Meteorological Council, May 10, 1881. [W. N. Shaw.]
1881–82	25	On fogs. [W. J. Russell.]
„	29	Report on the Results of a Tentative Reduction of a Year's Electrograms at the Kew Observatory. [G. M. Whipple.]
1882–83	27	On the Results obtained by the use of the Harmonic Analyser.
1884–85	22	Note on Work done with the Harmonic Analyser.

Year.	Page.	——
1885-86	22	Memorandum on Cloud Photography, by Prof. Stokes, F.R.S.
1886–87	21	On the Distribution of Gales round the Coasts of the British Isles [for the 15 years, 1871–85].
1887-88	22	On the History of the Severe Storms which visited the British Isles between August 1, 1882, and September 3, 1883, as traceable from the Atlantic Charts published by the Office. By Robert H. Scott, F R.S., Secretary.
„	30	Abstract of Report on Hygrometric Methods, by W. N. Shaw, M.A., reprinted from the "Proceedings of the Royal Society," No. 262.
1888–89	22	Notes of some Results of an Examination of Atlantic Charts published by the Office, by R. H. Scott, F.R.S., Secretary.
„	27	Memorandum on the Measurement of Squalls shown on the Traces yielded by Robinson Anemometers of the "Standard" Pattern, by R. H. Curtis.
1889–90	24	Code of Regulations, &c. for conducting the work at the Firs Class Observatories, and the Examination thereof. [*See* also Report, 1868.]
„	36	Note on Experiments on Pressure of Wind made by W H. Dines.
„	46	Experiments with Violle's Actinometer Apparatus.
„	47	On the Work done with the Harmonic Analyser at the Meteorological Office.
1890–91	22	On Mr. Dines' Anemometer Experiments.
1891–92	23	On Anemometer Comparisons carried out by the aid of a Grant from the Meteorological Council, by W. H. Dines, B.A.
1892–93	21	On the Construction of the Anemometer recently erected for trial on the roof of the Meteorological Office, by W. H. Dines, B.A.
„	27	On the Harmonic Analysis of Hourly Observations of Air Temperatures at British Observatories, by Lieut.-Gen. R. Strachey, F.R.S.
1894–95	22	Report on Weather Forecasts during the Hay Harvest of 1894, by H. N. Dickson.
„	27	Report on the Comparisons made between two Pressure Tube Anemometers on the roof of the Meteorological Office, by R. H. Curtis.
„	29	Note on the Exposure of the Robinson Anemometer at Holyhead, by R. H. Curtis.
1895–96	24	Note on Anemometer Experiments, by R. H. Curtis.
1897–98	21	Report upon Anemometer Experiments at Holyhead, by R. H. Curtis.
„	28	Description of the Bridled Anemometer designed by Sir G. G. Stokes, Bart., F.R.S., by R. H. Curtis.

Year.	Page.	——
1899–1900.	104	Report upon Anemometer Experiments at Holyhead by R. H. Curtis.
„	108	Researches on Atmospheric Electricity, with Reports, by C. T. R. Wilson.

VI.—Hourly Readings of the Self-Recording Instruments of the Observatories in connexion with the Meteorological Office.

Year.	Page.	——
1883	[1]	Constants of formulæ expressing the mean daily range of temperature obtained by the use of the Harmonic Analyser.
1884	[1]	Tables and formulæ to facilitate the computation of harmonic coefficients. By Lieut.-General Strachey, R.E.

VII.—Hourly Means of the Readings obtained from the Self-Recording Instruments at the Five Observatories under the Meteorological Council.

Year.	Page.	——
1891	[1]	Tables of Hourly Sunshine Values, with Plates, for the Ten Years 1881–90, for Seven Observatories.
1895	[6–80]	Mean Hourly and Extreme Values of Pressure and Temperature, and Amount and Frequency of Rainfall, for each month of the 25 years, 1871–95; also Amount and Frequency of Sunshine for each month of the 15 years, 1881–95.

VIII.—Meteorological Observations at Stations of the Second Order.

Year.	Page.	——
1891	[186]	Results of Observations at Stations of the Second Order for the Fifteen years, 1876–90.

APPENDIX XIV.

LIST OF PUBLICATIONS ISSUED UNDER THE AUTHORITY OF THE METEOROLOGICAL COUNCIL.

The list is arranged under the following headings :—

1. Periodical Publications and Reports.
2. Occasional Publications.
3. Instructions in the use of Instruments.
4. Marine Meteorology.
5. Miscellaneous Publications.

1. Periodical Publications.

Daily Weather Report. (Issued to Subscribers only.) Subscription, £1 per annum.

Weekly Weather Report. With Appendices and Monthly Supplements priced separately :—

*1888. Vol. V. (Official, No. 85.) 4*d.* per week. Annual subscription, including Supplements and Appendices 21*s.* 2*d.*

1889–1901. Vols. VI.–XVIII. (Official, Nos. 86, 87, 96, 100, 107, 111, 116, 121, 128, 133, 138, 144, 150.) 6*d.* per week. Annual subscription, including Supplements and Appendices, 30*s.*

Monthly Pilot Charts of the North Atlantic and Mediterranean. *See* Marine Meteorology.

Monthly Weather Reports :—

1884. (Official, No. 62.) Jan.–March, May–Nov., 1*s.* 6*d.* each ; April (with two Appendices), 2*s.* 6*d.* ; Dec., 1*s.* 9*d.*

1885. (Official, No. 65.) Jan. to Dec., 1*s.* 6*d.* each

1886. (Official, No. 68.) Jan. to Dec., 1*s.* 6*d.* each.

†1887. (Official, No. 77.) Jan. to April, 1*s.* 6*d.* each ; May to Dec., in wrapper, 12*s.*

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* The publication of the Weekly Weather Report began in February 1878. Annual subscription, including supplements and appendices, post paid, 1878–1883, 12*s.* 6*d.* ; 1884–1887, 21*s.* 2*d.*

† The publication of the Monthly Weather Report was continued after this date as a Supplement to the Weekly Weather Report.

1. Periodical Publications—*continued.*

Quarterly Weather Reports :—

1869. (Official, No. 7.) Parts I. to IV. 5*s*. each.
1870. (Official, No. 9.) Parts I. to IV. 5*s*. each.
1871. (Official, No. 14.) Parts I. to IV. 5*s*. each.
1872. (Official, No. 16.) Parts I. to IV. 5*s*. each.
1873. (Official, No. 19.) Parts I. to IV. 5*s*. each.
1874. (Official, No. 25.) Parts I., II., and IV., 5*s*. each; Part III., 5*s*. 9*d*.
1875. (Official, No. 30.) Parts I. to IV. 5*s*. each.
1876. (Official, No. 33.) Part I., 6*s*.; Parts II., III., and IV., 5*s*. each.
1877. (Official, No. 52.) Part I., 10*s*.; II., 5*s*.; III., 4*s*. 6*d*.; IV., 6*s*.; Appendices and Plates, 27*s*.
1878. (Official, No. 55.) Parts I. to IV., 6*s*. each. Appendices and Plates, 28*s*.
1879. (Official, No. 49.) Parts I. to III., 6*s*. each; IV., 5*s*. 6*d*.; Appendices and Plates, 27*s*.
1880. (Official, No. 50.) Parts I. and II., 6*s*. each; III., 4*s*.; IV., 6*s*.; Appendices and Plates, 28*s*.

ANNUAL Volumes :—

Reports of the Meteorological Committee :—

1867. (Official, No. 1.) 1*s*.
1868. (Official, No. 5.) 5*d*.
1869. (Official, No. 6.) 10*d*.
1870. (Official, No. 10.) 10*d*.
1871. (Official, No. 15.) 10*d*.
1872. (Official, No. 17.) 1*s*.
1873. (Official, No. 22.) 4*d*.
1874. (Official, No. 26.) 6*d*.
1875. (Official, No. 29.) 4*d*.
1876–77. (Official, No. 31.) 3*s*. 5*d*.

Reports of the Meteorological Council :—

1877–78. (Official, No. 35.) 1*s*.
1878–79. (Official, No. 38.) 5*d*.
1879–80. (Official, No. 41.) 1*s*.
1880–81. (Official, No. 42.) 1*s*. 2*d*.
1881–82. (Official, No. 48.) 1*s*.
1882–83. (Official, No. 58.) 10½*d*.
1883–84. (Official, No. 64.) 1*s*. 2*d*
1884–85. (Official, No. 67.) 4*s*. 4*d*.

1. Periodical Publications—*continued.*

ANNUAL Volumes—*continued.*

Reports of the Meteorological Council—*continued*

1885–86. (Official, No. 72.) 8*d.*
1886–87. (Official, No. 75.) 8*d.*
1887–88. (Official, No. 79.) 1*s.*
1888–89. (Official, No. 84.) 5½*d.*
1889–90. (Official, No. 91.) 7½*d.*
1890–91. (Official, No. 99.) 5½*d.*
1891–92. (Official, No. 104.) 6*d.*
1892–93. (Official, No. 109.) 8*d.*
1893–94. (Official, No. 112.) 7½*d.*
1894–95. (Official, No. 119.) 8½*d.*
1895–96. (Official, No. 122.) 8½*d.*
1896–97. (Official, No. 130.) 8*d.*
1897–98. (Official, No. 136.) 11*d.*
1898–99. (Official, No. 140.) 7½*d.*
1899–1900. (Official, No. 147.) 11½*d.*

Observatories and Stations.

*Hourly Readings from the Self-Recording Instruments at the . . . Observatories under the Meteorological Council :—

1881. (Official, No. 51.) Part I., 10*s.* 6*d.* ; Parts II. III., and IV., 21*s.* each.

1882. (Official, No. 54.) Parts I. and II., 20*s.* each ; III., 22*s.* 6*d.* ; IV., 26*s.*

1883. (Official, No. 63.) Parts I., II., and III., 21*s.* each ; Part IV., 30*s.*

1884. (Official, No. 70.) Part I., 12*s.* ; II., 10*s.* III., 10*s.* 6*d.* ; IV., 15*s.*

1885. (Official, No. 74.) Parts I. and II., 11*s.* each ; III., 10*s.* 6*d.* ; IV., 12*s.*

1886. (Official, No. 81.) Parts I., II., and III., 10*s.* 6*d.* each ; Part IV., 12*s.* 6*d.*

Hourly Means of the Readings obtained from the Self-Recording Instruments at the . . . Observatories under the Meteorological Council :—

1887. (Official, No. 94.) 16*s.*
1888. (Official, No. 97.) 20*s.*
1889. (Official, No. 103.) 15*s.*
1890. (Official, No. 105.) 20*s.*
1891. (Official, No. 113.) 32*s.* 6*d.*

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OTHER PUBLICATIONS ON MARINE METEOROLOGY—*continued.*

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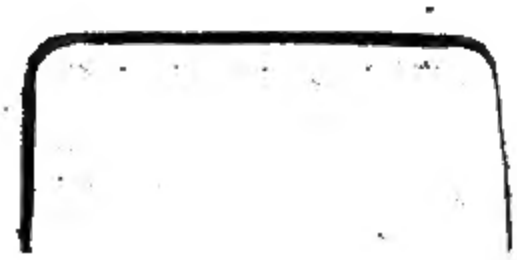
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